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The Salt Lake Mining Review

VOL. 23 NO. 1

SALT LAKE CITY, UTAH, APRIL 15, 1921

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622.05 5L A Trip Through the Uintah Basin (Part X) 622.05 V.23 5L

BY PROF. EARL DOUGLASS*

"Notice the direction of these veinlets of gilsonite (photographed in last article, No. IX). They take the same course as the larger veins in the Uinta sandstone above. Did you notice the jointing in the Green River shales below?"

"Yes, the rock is much like bacon or bread that has been sliced but the slices not removed; and the direction is the same as that of these veins."

"Do you suppose that the petroleum or its residue had anything to do with the making of these seams?" a lady asked, and then said quickly, "Why, no; what a foolish question. Of course the oil or its soft residue couldn't break the rocks open and push them apart."

"No," said her husband. "When a horse and cart are going along hitched together it is safer to assume that the cart is going because the horse is pulling than that the horse is going because the cart is pushing him."

"What do you think has caused the formation of these parallel seams?"

"We must not too quickly form theories," said the professor; "but let us observe the facts and see if they will suggest a possible or probable explanation. We are

after the facts now. You remember when we were at the top of the hill we noticed that the rock was not level but—what?"

"It forms a wave or an anticline which dies out somewhere to the northwestward."

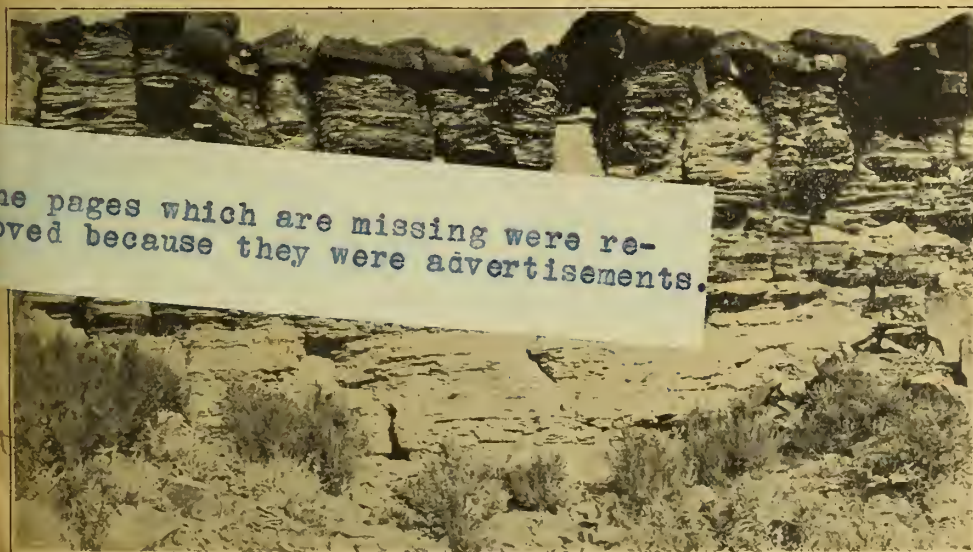
"About northwest and southeast, isn't it?"

"I think it extends a little west of northwest and east of southeast."

"How about these regular fissures in



Green River Shales, showing mode of weathering and anticlinal structure. Looking southward across White River Canyon. The beds dip both toward the observer and to the right.



The pages which are missing were removed because they were advertisements.

Jointing in portions of the Green River formation, Hill Creek, Utah.

*Geologist for the Carnegie Museum, Jensen, Utah.

"In what direction is the middle line of the uplift?"

parts of the Green River formation and the larger gilsonite veins? You remember we took the angle of the directions of the vein at Bonanza."

"It was north about 74 degrees west. The direction of this anticline and that of the veins and fissures are about the same, aren't they?"

"It looks that way, doesn't it?"

"I wonder if there is any constant relation between the two."

"Perhaps some one has made a careful study of jointing in relation to uplifts, but I have not had access to such a treatise. If any one knows of such a work I would be glad to have them refer us to it. Anyway, it is important here and on account of the extensive exposures of the rocks it is an excellent place to study such phenomena. The jointing in the Green River shales is very remarkable. I have several pictures which I will show you. Here is a picture taken from the top of the canyon on Hill Creek about fifty miles west of



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here. You see that the top of the bluffs is quite evenly fractured and in approximately the same direction as at this place, while the fracturing is not so regular or so evident in the lower band shown in the picture. Here is another photograph showing a nearly complete section on the opposite side of the little canyon. Here you see the same band of jointed shale above a prospect hole in the rich, heavy, massive carbonaceous shales. These beds are near the lower portion of what we call the Green River shales."

"Is there gilsonite in these veins?"

"We did not observe any."

"Sometimes the jointing is extremely peculiar and seems almost beyond explanation. In higher portions of the Green River, in the region of Hill Creek and Willow-Creek west of Watson, there are thin layers of

hard sandstone in the softer beds. These are sometimes broken into long narrow slabs so regular that they look at a little distance like wooden fence palings.

"Here is a picture showing where some one has built cob-houses of these palings and has made leaning fences by crossing the upper ends over each other. The fence is partly torn down but you can see two cob-houses, one of which is nearly complete. The gentleman in the picture is holding up one of the slabs."

"Is it possible that nature has made these slabs?"

"Yes, there is no doubt about it."

"The cob-houses, etc., plainly show the hand of man. Isn't it possible that man made the stone palings?"

"No, you can see them undisturbed wherever these sandstone strata are ex-

posed—hundreds of thousands of them—and the thinner the sandstones the narrower the slabs."

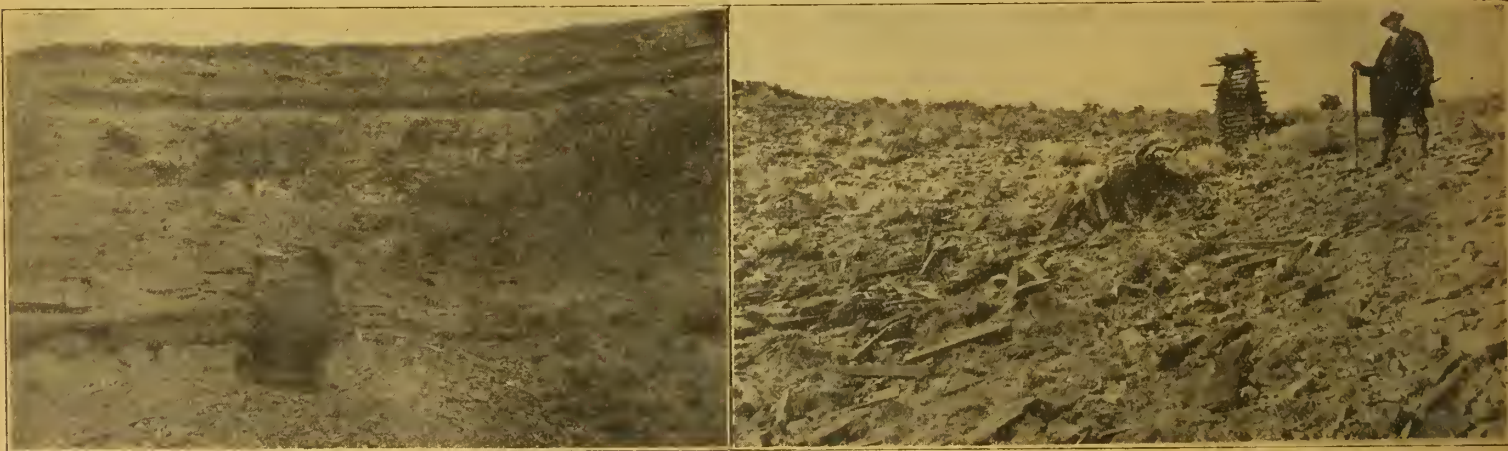
"Who made the fence and houses?"

"I do not know. Some of the old inhabitants say they were there when the white men first came. They have a rather old appearance. If the Indians didn't do it probably some sheep herder constructed them to pass away the time."

"Sometimes, when there are two joint-planes, both vertical and one at right angles to the other, as on Hill Creek, near the Taylor ranch, erosion and weathering produce architectural forms resembling cathedrals, temples, etc., with terraces adorned with square columns and statuary of cubist style. In looking at these one is reminded of the fact that instead of being new, cubist art is extremely ancient."



Left—One of Nature's suggestions in architecture. A pleasing combination of dome and columned terrace. The pillars and the massive sculptured figures, especially those impressively guarding the ancient temple above, show that cubist art is not new, but millions of years old. Right—Cathedral-like structure caused by weathering of cross-jointed rocks, Hill Creek, Utah.



Left—Assessment work hole in more massive carbonaceous shales and jointing in beds above. Green River formation, Hill Creek, Utah. Right—Peculiar jointing of isolated layers of thin bedded sandstones in Green River formation. What appears to be a cane in the geologist's hand is a natural stone paling. The dilapidated fence and cob houses are of the same material.

CERRO DE PASCO CO.

BUILDING \$9,000,000 SMELTER.

Cerro De Pasco Copper Company's new \$9,000,000 smelter at Orays, Peru, is expected to be completed in the summer of 1922, says a recent New York dispatch. Despite the fact that the company's ore has a high gold and silver content, it is costing

Cerro more than 15 cents to make its copper, after all charges and taxes depreciation and depletion.

However, the company is in a better position than many other big producers from the standpoint of cash and liquid assets. Returns from the \$8,000,000 bond issue put it in a position where it should have little difficulty carrying its metal.

On account of affiliation with American Metal Company, Cerro did not supply any of the 400,000,000 pounds of copper held for resale abroad, and which is being used as collateral for the recent issue of \$40,000,000 Copper Export association 8 per cent notes. Some of the companies in the association purchased a substantial amount of these notes.

Creating New Copper Demand Is Salvation of Industry

BY PROF. R. A. DEAN

The perpetuation and prosperity of the copper mining industry is of momentary interest to everyone. So it is to the individual interest of everyone to do all in his power to aid in keeping up the demand for copper so that the mines may work at a profit and the country be prosperous.

Just at present there is a huge over-supply of copper. Prices have gone down and copper mines that are working are doing so at a loss, while many have ceased production entirely.

One of the chief reasons for this over-supply of copper is that during the world war the production of copper was greatly increased in order to provide the big supply needed for munitions of war. Not only did mine production increase enormously but the kitchens of every family in Europe were depleted of all their copper utensils. Brass doorknobs, railings, ornaments and pipes were all taken away to supply the war demand.

Now, this copper was not lost. It was only used for the time being to create havoc and destruction, and to take human lives. After that the used shells and abandoned copper and brass found on the battlefields were carefully gathered up to be used again; that is, it was salvaged. All this salvaged brass and copper is now on hand in Europe to supply the demand for copper in the industries.

The great war production of the mines kept on and now Europe does not buy what is produced because it still has a big supply of salvaged copper on hand and also because it has no money with which to buy the big stocks we have on hand.

Early in February Mr. Ivy L. Lee, adviser in publicity and public relations to various corporations, including the Copper and Brass Research Committee, delivered an address before the American Institute of Mining and Metallurgical Engineers on the subject of "Copper metal from the consumers' point of view," in which he urged that every effort should be made right here at home to increase the number of consumers of copper. Let me quote from and briefly review Mr. Lee's remarks. He says:

Copper Metal Relegated to Background.

"With Europe practically shut out of the American copper market our copper industry has been obliged to turn to domestic consumption for existence.

"And what has it found? It has found the market glutted with substitutes for which a tremendous demand has been created as a result of advertising. It has found a public thoroughly well educated in what merits these substitutes possess, and keenly

disposed toward them because they answer immediate requirements and are obtainable at a much lower cost than copper and copper products. They find that the public generally speaking knows little of copper, although it is the oldest of commercial metals.

"Of what use is it to have a superior article if the public doesn't know it is superior and that in all its standard uses it works a large saving because of its everlasting life and absence of upkeep expense, to say nothing of its salvage value?

"Twelve years ago aluminum was a drug on the market. Among retailers of kitchen utensils it was known as 'lemon metal.' Aluminum was used for about a quarter of 1 per cent of the utensils in use in the United States. Under improved processes of manufacture a good grade of aluminum was produced, but so evil was the metal's reputation with housewives that it could not be sold. So a campaign of education was planned and carried out. Today aluminum is used for more than 50 per cent of the utensils in this country.

"Who ever heard of Armeo iron until the American Rolling Mills Company began to placard the country with its merits to get its message into every manufacturing establishment and every home in the country. In 1914, when its publicity effort began, its output was 25,000 tons per year. Today the output is 200,000 tons per year.

"Then there is Monel metal, an alloy that contains about 28 per cent of copper from which I am told it gets much of its merit. In the first eight months of its campaign of public education the International Nickel Company more than tripled its sales of Monel metal.

"All these metals are sold in direct competition with copper and copper products."

Education and Co-operation Campaigns Suggested.

He then mentions the substantial results that have followed the campaigns of education of the New Jersey Zinc Company, the American Face Brick Association, the California Fruit Growers' Exchange, the California Raisin Association and the Brazilian coffee growers.

He then tells of the great increase of copper production since 1895 and also tells of the great range of copper prices and thus shows the great need of stabilization.

He continues: "Then how is the copper industry to be stabilized to protect itself from these constantly recurring dangers of over-production?"

"This question brings me squarely up to the ultimate consumer, and by the ultimate consumer I mean everybody who uses pins.

hardware, screws, nails; the man who owns a home or is about to build one, and has the problems of roofing and plumbing to consider; the men who are engaged in the erection of office buildings, apartment houses, or hotels, and who in addition to their roofing and plumbing have thousands of articles of ornamentation such as door-knobs, hinges, locks, bolts, window catches, electrical apparatus and fixtures and a myriad of other things to consider; the man who is going to buy an automobile and will never know unless he is told that vital parts formerly made of copper, because of its non-rusting qualities, are now made of steel.

"I could make this list almost any length, for it is a fact that copper, brass, bronze and other copper alloys, go into many hundreds of small articles that are in use in every American home. The enormous total tonnage represented by these things may be gauged from the fact that nearly 2,000,000 pounds of brass go into the manufacture of pins alone each year in this country.

"Pins, by the way, are the only form in which copper goes into consumption that represents no return in scrap. No human being has ever yet been able to find out what becomes of the pins.

"I will not dwell upon copper for electrical purposes. But the domestic consumption of copper—the output of which from our rolling mills in finished materials in 1919 was 700,000,000 pounds without including wire—can be greatly increased and stabilized by public education.

Havoc Created by Neglect.

"The job that copper had on its hands when the war ended was to get itself back into industry as quickly as possible. And here is where early neglects came home to roost. Those who had been compelled to sell substitutes during the war period made much larger profits out of these substitutes than they ever made out of copper or brass.

"Architects, builders and plumbers, idle during the war period and hungry for work, refused to discourage prospective clients by specifying copper or brass for roofing, plumbing or ornamentation, because to do so meant to increase the amount of a building budget.

"Manufacturers of screws, screw parts, nails and hardware generally did very well with steel, thinly coated with copper or brass during the war, and as long as the customer made no complaint they did not think it necessary to return to real copper and brass afterwards."

Mr. Lee then tells of visits to architects and what they are saying. How they prefer copper in all the specifications but the substitutes are so much cheaper and so they put them in to decrease the price and land the job. Builders, plumbers and roofers, all told the same thing.

Manufacturers Wedded to Substitutes.

"Automobile manufacturers told us that they had cut copper and brass down to the lowest possible point during the war, because of the scarcity of these metals, and that they had continued the use of steel and certain patented alloys after copper and brass became more plentiful, because they found it cut down the cost of production and did not bring any complaint from the customers. At the same time they admitted that the tremendous growth of the automobile-repair business in this country during the past five years was due in no small way to the substitution of other metals for copper and brass in the working and structural parts of automobiles.

"I have already mentioned the losses of copper in the utensil field. Here is the situation on utensils as given me by the leading dealers in kitchen ware: Fifty per cent of all the kitchen utensils sold in the United States today are made of aluminum; 25 per cent are of enamel ware of different makes. The remaining 25 per cent is divided among copper, iron, glass (Pyrex) and Monel metal, copper representing 8 per cent of the whole.

"Yet copper is admittedly the best metal for utensils in spite of certain handicaps. Chief of these are the cleaning and the necessity of tinning. The cleaning problem should be overcome if any particular study ever had been made of it. But in present circumstances the tinning is an expensive operation and there are few places where it is done. In Europe the dealer in copper utensils takes care of these things. They have scores of different kinds of powders and pastes specially made for cleaning copper and even in the smallest villages there are tanners who make a speciality of tinning the inside of the copper vessels used in cooking."

(Note)—From an Italian friend I learn that in Italy itinerant tanners of copper travel about. Their process is a very simple one. They heat the copper, coat it with melted rosin and apply the tin. It ought not to be expensive to do that here.

Mr. Lee continues: "Among large manufacturers of foodstuffs, and in hotel and steamship kitchens, copper is still used to a considerable extent." He adds that it is being rapidly displaced.

Consumers Must Demand Copper and Brass.

He then says: "I need hardly tell you gentlemen of the superiority of brass over any other metal for piping, especially for hot water supply. Yet in the large office buildings, hotels and apartments in this city, brass represents but a small percentage of the total outlay for plumbing. For instance, the plumbing in the Woolworth building cost \$450,000 of which only \$32,400 represents brass pipe. In the Western Union building the plumbing cost \$260,000 of which only \$19,500 went for brass pipes. The plumbing in the Commodore hotel cost \$900,000 of which \$3,150 was spent for brass

pipe. In the Pennsylvania hotel the total of plumbing was \$1,450,000 of which \$36,000 represents brass pipe."

Mr. Lee ends his speech by saying: "Wherever copper and copper products are understood they are used. In Germany whole store fronts are made of sheet copper. In Turkey and certain other countries man's wealth is measured by the number of copper kettles he owns. In this country the virtues of copper and its alloys are not generally understood."

Government Aids Mining In the Alaskan Districts

By JOHN A. DAVIS*

The method generally employed in the placer camps of Alaska for the recovery of gold from the heavy "black sand" remaining in the sluice boxes and riffles after each "clean-up" is treatment with mercury in a revolving barrel or drum. Owing to the fact that assays showing the amount of gold contained in the black sand before and after treatment are not made, it is impossible to state definitely just what percentage of recovery is obtained by this method, but it certainly is not high, because there are losses from "floured" quicksilver and because the mercury does not amalgamate readily with gold that is "rusty" or that is covered with grease and dirt.

In the attempt to overcome this difficulty it is the custom to use potassium cyanide or sodium cyanide in varying amounts; but unless this is done with sound judgment, the losses from solution of gold by cyanide will be greater than those the treatment is intended to prevent. The result is usually a compromise, and the recovery of gold is probably not much more than 85 per cent, and, in extreme cases where the gold particles are very fine, it may be as low as 65 per cent or 70 per cent.

In the effort to devise a means of preventing this waste, the Alaska station of the Bureau of Mines has conducted a series of experiments employing various methods of recovering the gold. The results of these experiments demonstrate that the loss of gold through solution by cyanide can be prevented if caustic soda or soda ash is substituted to remove grease and dirt, and that rocks or pebbles, which cause a certain amount of grinding or attrition, should also be used. The recovery in a number of tests at the station, using this treatment, was found to be higher than 99 per cent and rarely less than 98 per cent.

For large quantities of black sand, the amount to be amalgamated can be greatly reduced by employing close hydraulic clas-

I can end no better than by saying: Let every householder insist upon buying copper kitchen utensils; let every builder insist upon using copper wherever possible; let the hardware merchants help by offering copper ware and urging its use, even if their profits are less, and thus by everyone doing his bit we can help to increase the demand for copper, to increase its price and to make our mining country and our miners as prosperous as they deserve to be and as we all would like to see them be.

sification, followed by concentration on a reciprocating table with amalgamation of the concentrate and middling products. By this treatment the recovery was occasionally as high as 99 per cent and rarely less than 95 per cent. However, close classification is essential, otherwise the efficiency of the reciprocating table is greatly reduced and the recovery is much less, sometimes as low as 85 per cent.

Placer Miners Much Interested.

These experiments have aroused a great deal of interest among the Alaska placer miners, many of whom are taking advantage of the results obtained, with a consequent greater saving of gold in their mining operations.

In order to promote the highest efficiency and thus obtain the greatest recovery of valuable metal from the ores, the Alaska station of the bureau is making a study of the ores and of the methods and processes employed at mines and concentrating plants in the district, together with laboratory tests of products obtained during their operation.

As an example, two tests which have given positive results are described below. Ordinarily the bureau does no ore testing work for the benefit of private companies or individuals. However, such work is done when there are no private agencies which have the necessary equipment and are qualified to conduct tests of this kind, and when the work has enough public interest to justify governmental assistance. This is true of Alaska, as this large territory is scantily supplied with private laboratories in which tests can be carried on for the benefit of owners of small properties who are attempting to develop them, and as Alaska is still in large measure a ward of the government, federal assistance in its development is warranted.

The first was made at a stamp-battery and amalgamation mill situated on Skoogy gulch. The objects were to determine whether the amalgamation was satisfactorily efficient; the advisability of coarser

*Superintendent, Alaska Experiment Station, U. S. Bureau of Mines.

crushing in the battery; the economic advantage of concentration after amalgamation; and the advisability of cyanidation of the mill tailing either as a present or future consideration. The recommendations made as a result of this work resulted in an increased efficiency in amalgamation, an increased capacity through coarser crushing, the realization that the amalgamation tailings should be concentrated, and that the tailings should be impounded for future treatment, thus saving a waste of gold from this source.

A similar investigation was made with tailings from a mill situated on Too-Much-Gold creek. The object of this was to devise means of preventing gold losses being sustained with a stamp battery and amalgamating plate. The work resulted in increased recovery by amalgamation, and the recommendation of concentration for the tailing. The owners are not in a position to install the concentrating equipment at the present time, but they are impounding the tailing and expect to concentrate them at an early date.

Complex Ore Tests Yield Results.

The station has not developed any process that is new to the metallurgical industry, but by the application of methods and principles used elsewhere it has devised methods for treating ore that can not be treated profitably by the methods at present employed in this district.

The first metallurgical test made by the station after its establishment at Fairbanks was of this character. The owners of a mine at the head of Cleary creek, containing a complex silver-bearing ore of lead, silver, zinc, antimony and iron sulphides, were unable by the primitive methods of mining they were using, to obtain a product of high enough grade to pay expenses. The object of the test, therefore, was to devise a method of concentration which, without the aid of skilled supervision and experienced labor, would produce a concentrate carrying sufficient lead and silver to bear the high cost of mining, treatment and shipping and be free enough from zinc and antimony to avoid excessive smelter penalty charges.

Four tons of the ore were shipped to the station and tested. The results were quite satisfactory from a metallurgical point of view, and it was found that a good shipping product could be made with a reasonable percentage of recovery. But the initial cost of the concentrating plant was greater than the development of the mine at that time warranted, and the owners were advised therefore to continue mining development before erecting a concentrating plant.

A test was made of a free-milling gold ore from a mine situated at the head of St. Patrick's creek. The object of this test was to determine whether, in the plant the owners proposed to erect, a stamp mill, or a ball mill would be more suitable for

crushing the ore; the efficacy of the amalgamation process for recovering the values; the advisability of concentration after amalgamation; and the feasibility of cyanidation of the tailing. The results showed that the ore would be suited to crushing either in stamps or a ball mill, the latter having a slight preference. It would present no difficulty to amalgamation. Concentration after amalgamation would be advisable, followed by cyanidation of the tailing.

As in the previous case, however, the tonnage of ore developed did not warrant the cost of a concentrating plant, and the owners were advised to continue development. They are doing so, treating their ore meanwhile in a nearby custom plant using a Lane mill and amalgamation; but they will ultimately erect a concentrating plant along the lines indicated by the test.

The station has conducted a number of other similar tests, the results of which have been negative from the metallurgical point of view, due to the fact that the ore tested was of too low grade to be treated profitably under the high cost of machinery, fuel, labor and supplies in this district. They have been of positive benefit, however, in preventing the erection of concentrating plants that undoubtedly would have been unsuccessful and resulted in a loss of time and money to the industry.

Helping the Prospector and Miner.

In addition to these investigations, the station is conducting other lines of work intended to promote the good of the mining industry in Alaska.

Perhaps the chief of these is the making of qualitative determinations and assays for prospectors and mining men. This service gives the prospector a quick and dependable means for determining whether a rock or mineral he may have found is of any value, whether to continue prospecting at this point or to search further; or, if he is developing a claim, it enables him to do so intelligently. Much interest in this work is displayed by the mining men of the district, and many favorable comments have been received upon it.

The fuel investigations conducted by the station are also promoting the good of the industry. The increasing scarcity and cost of wood are making successful mining operations more and more dependent upon the lignite of the Nenana field. The firing tests have shown the comparative value for steam generation of wood and of lignite from the different beds as they have been opened, and have resulted in the mining of an increasingly better grade of this fuel. The studies also included weathering tests of the lignite, the determination for the Alaskan Engineering Commission (government railroad) of the weight per cubic foot, and an investigation as to the feasibility of using the lignite in a central plant at the lignite field with the transmission of power electrically to the metal mining districts.

METAL MINE ACCIDENTS GROW LESS.

That fewer men lost their lives in metal mine accidents in this country during 1919 than in any previous year for which statistics of accidents have been compiled is shown in a report just issued by the United States Bureau of Mines. The number of men killed was 468, as compared with 646 killed in 1918. The number of men injured was 31,506, as compared with 42,915 injured in 1918.

The fatality rate was the lowest on record for the metal mining industry in the United States, and the injury rate was lower than any year since 1914.

The number of men employed in the metal mining industry in 1919 was 145,262, a decrease of 27,344, or about 20 per cent, below 1918. The total working time for all employees was equivalent to 40,884,636 man-days of labor, or an average of 281 days for each employee; these figures indicate a decrease of 24.7 per cent and 5.4 per cent, respectively, from the record for the previous year.

For every 1,000 men employed during a full-time year of 300 working days 3.43 men were killed and 231.18 were injured.

The metal mining industry during 1919 was marked by unusual depression, the quantity of minerals produced, the number of persons employed, and the period of their employment all being much reduced. The number of employees at copper mines showed a decrease of 20,000; at gold mines, the decrease was more than 11,000, and at iron mines, there was a decrease of about 6,000. The number of employees at lead and zinc mines in the Mississippi valley was 1,000 below the number employed in 1918; while mines producing non-metallic minerals showed an increase of about 1,300 employees.

EDUCATIONAL MOTION PICTURE FILMS.

Two new educational motion picture films are announced as being ready for distribution by the United States Bureau of Mines.

"A dollar saved is a dollar earned," is the title of a film produced in co-operation with the National Association of Pipe Covering Industries. This film shows the advantages and economy that result when pipes and boilers are properly insulated and the radiation losses are thus overcome.

"The story of ingot iron," a three-reel picture showing the various steps in the process of making ingot iron for plates and sheets, was produced in co-operation with the American Rolling Mills Company of Middletown, Ohio.

Requests for the loan of these films should be addressed to the Bureau of Mines, 4800 Forbes street, Pittsburgh, Pa.

Estimating Gold, Silver, Platinum In Material High in Copper

By C. W. DAVIS*

Two general schemes have been used for the determination of gold and silver in material containing considerable quantities of copper; one is known as the "all fire" method, and the other as the "combination," or "wet and dry" method. The all fire crucible method, using an excess charge of litharge, has been found satisfactory when the copper content of an ore is under 6 per cent, (Loevy, J., *Vur Edelmetallbestimmung in ohchprozentigen Kupferenzen*; Chem. Ztg. Jarhrg. 35, 1911, p. 278), or where the precious metal value is so great that a small sample can be used. In the latter case, silica is added until the copper ratio is sufficiently low. If there is more than 6 per cent of copper in an ore, the lead button obtained from a crucible will require repeated scorification before it can be cupelled successfully. Rescorification is not only tedious, but also causes a slag loss of precious metals. In combination methods, the copper is dissolved, and the gold and silver in the residue is determined by fire assay. Although some combination methods have given satisfactory results for gold and silver, they are not applicable when an estimation of the platinum metals is required.

Since substances containing platinum are frequently high in copper, a study of methods which might be used for the estimation of small quantities of gold, silver, and the platinum metals in such material was considered worth while.

The estimation of platinum in ores by fire assay methods has been described in Technical Paper 270 of the bureau; (Davis, C. W., the detection and estimation of platinum in ores: U. S. Bureau of Mines Tech. Paper 270, 1921) the present paper, which is supplementary to that report, deals chiefly with the application of combination methods, taking them up to the point where the fire assay is to be applied.

Methods for Oxidized Ores.

The treatment described below for oxidized copper ores is based on the fact that the copper in such material is soluble in dilute sulphuric acid, whereas silver, gold and the platinum metals are not, as a rule, attacked by that reagent.

A representative sample, consisting of an assay ton of the finely pulverized ore, is heated in a beaker with 500 c. c. of 1:10 sulphuric acid (1 part concentrated sulphuric acid to 10 parts of water). The hot digestion should be completed in about fifteen minutes, then enough sodium chloride is added to precipitate any silver that might be in solution and, after stirring for a min-

ute or two, five drops of a 10 per cent solution of potassium iodide are added to precipitate palladium. The solution is heated to boiling, and then about 10 c. c. of saturated lead acetate solution is introduced to aid the settling of finely divided metals and compounds. The potassium iodide will precipitate all the palladium, and also carry down an insignificant amount of copper. A large excess of potassium iodide, however, will redissolve palladium. Although the silver and palladium are usually in an insoluble condition so that the addition of precipitants may not be necessary, it is best to be on the safe side and add sodium chloride and potassium iodide.

After standing until clear (preferably over night), the copper solution is decanted through a filter paper and washed with hot water; care should be taken to keep the solution sufficiently dilute to prevent crystallization of copper sulphate on the filter paper, for this would stretch the pores of the paper and let fine particles go through the filter. The residue is extracted with fresh portions of 1:10 sulphuric acid in order to dissolve additional copper, and the filtrates

introduces an unnecessary chance for mechanical loss of material. If only gold and silver are sought, ordinary fire assay methods may be used, but if the platinum metals are required, special methods which are described in Technical Paper 270 should be used.

The accompanying table shows that with careful manipulation results may be obtained by a combination process, that check closely those secured by all fire methods.

Comparison of Results.

(Samples were ground to pass a 200-mesh screen and thoroughly mixed. 0.50 mg. of palladium was added to each of samples 1, 2, 3, 4, 9, 10, 11, and 12, and 15.00 mg. of silver was added to each of the other samples. Check assays were run and the results corrected for losses.)

Method for Sulphide Ores.

The combination methods generally used for the determination of gold and silver in copper sulphide ores are not satisfactory when the platinum metals are to be estimated, for methods such as that of Van Liew. (Van Liew, R. W., Losses in the determination of gold and silver in copper bullion, their causes, and a method for overcoming them: Eng. and Ming. Jour., Vol. 69, 1900, p. 498), using nitric acid, would dissolve palladium if it were present.

A number of experiments were conducted in order to find a solvent which would remove the copper from copper sulphide ores

Sample No.	Description of ore*	Cu. per cent	"Combination" Method				"All Fire" Method			
			Ag-mg	Au-mg	Pd-mg	Pt-mg	Ag-mg	Au-mg	Pd-mg	Pt-mg
1	Carbonate	11.7	44.10	0.43	0.49	....	43.82	0.38	0.47	....
2	"	11.7	43.86	0.40	0.47	....	43.64	0.43	0.50	....
3	"	11.7	44.05	0.41	0.48	....	43.94	0.42	0.47	....
4	"	11.7	43.81	0.42	0.47	....	44.09	0.40	0.45	....
5	"	7.2	18.15	0.65	0.68	0.57	18.26	0.60	0.66	0.52
6	"	7.2	18.18	0.62	0.71	0.53	18.10	0.64	0.67	0.54
7	"	7.2	18.42	0.63	0.64	0.50	18.31	0.65	0.65	0.56
8	"	7.2	18.37	0.61	0.67	0.54	18.52	0.62	0.62	0.55
9	Sulphide	43.2	15.41	0.02	0.48	....	15.62	0.03	0.42	....
10	"	43.2	15.48	0.03	0.44	....	15.43	0.02	0.43	....
11	"	43.2	15.62	0.03	0.43	....	15.02	0.03	0.49	....
12	"	43.2	15.80	0.03	0.46	....	14.98	0.02	0.45	....

*The samples of ore analyzed were kindly donated by W. S. Palmer, Professor of Metallurgy at the University of Nevada.

treated as before to save dissolved silver. It is not necessary to remove all of the copper, but its content in the residue should not be large.

When sufficient copper has been removed, the residue is transferred to the filter paper, care being taken to remove any particles that may stick to the beaker. This is best done by using a rubber "policeman" and a stream of hot water. One assay ton of litharge is put into a fire-clay crucible, and the moist filter paper with its contents are placed on top of the charge. At first the material is heated slowly, then the temperature is raised until the filter paper ignites. The crucible is then covered, removed from the furnace and cooled. The material is then ready to be mixed with suitable fluxes and analyzed by fire assay methods. The moist residue and filter paper may be heated in a roasting dish, but this procedure in-

without attacking the precious metals. The most promising reagent tried was a mixture of ten parts of 3 per cent hydrogen peroxide and one part of sulphuric acid (specific gravity, 1.84) by volume. With this mixture, the copper from some sulphide ores was dissolved in a few hours, while the copper sulphide of other ores was only partly decomposed by long continued digestion.

In order to convert a sulphide ore to a form in which the copper would be soluble in dilute sulphuric acid, a preliminary roast was used. Loss of silver occurs when some sulphide ores are roasted at a temperature sufficiently high to break up sulphates that are formed, (Fulton, C. H., A manual of fire assaying, 2nd ed., 1911, p. 121), but since it is desirable to have sulphates present, the best temperature to use will cause no volatilization losses of the precious metals.

One assay ton of a satisfactory sample of

*Assistant Chemist, Bureau of Mines.

ore is placed in a roasting dish of such size that the material may be stirred without danger of spilling. The material is carefully roasted, with occasional stirring, the temperature should be low at first and gradually increased until at the end a dull red heat is maintained, but it should not exceed 600 deg. C. at any time. The stirring should be carefully done in order to prevent loss, a bent iron wire being convenient for this purpose. If the material decrepitates, it should be covered by an inverted roasting dish until all danger of loss is over. If the ore becomes fused by too rapid heating, a new sample should be used and greater care taken in its roasting. When the odor of sulphur dioxide can no longer be detected, the ore is cooled and then treated exactly as in the method given for oxidized ores.

This procedure will give accurate results only when the analyst is willing to use care in his manipulation, and is free to give necessary attention to the details of the process. A few results of the assay of sulphide ores are given in the table.

Method for Bullion.

Combination methods for copper bullion or matte involve the use of either nitric acid (Van Liew, Work cited), or concentrated sulphuric acid, (Hunt, F. F., Determination of gold in copper bullion, Eng. and Min. Jour. vol. 87, 1909, p. 465), alone or both of these acids in combination with cupric sulphate, mercuric sulphate, or mercuric nitrate (Flinn, F. B., Assay of gold in copper bullion; Eng. and Min. Jour. vol. 87, 1909, p. 569). These reagents dissolve palladium which, once dissolved in a nitric acid solution, together with large amounts of copper, is difficult to recover.

In order to get around this difficulty a solvent was sought which would dissolve metallic copper without affecting finely divided platinum metals. After many failures it was found that a mixture consisting of one part of concentrated sulphuric acid and ten parts of 3 per cent hydrogen peroxide would accomplish this when the metals were present together. When the metals were alloyed with copper, however, palladium went into solution along with the copper, but was precipitated by means of potassium iodide after first boiling off most of the hydrogen peroxide and then decomposing the rest with ferrous sulphate.

A sample of copper bullion as finely divided as convenient (good samples are obtained by sawing small bars or ingots of metal and using the sawdust) is treated with a mixture of ten parts of 3 per cent hydrogen peroxide and one part of concentrated sulphuric acid. About 600 c. c. of the mixture is required for an assay ton of metal. After solution is nearly complete the material is boiled for about half an hour to remove most of the hydrogen peroxide, and ferrous sulphate is added to complete the reduction. Then sodium chloride is added, and the pro-

cedure given in the method for oxidized ores is followed.

When the metal is not readily attacked by the previous treatment, the copper may be dissolved in nitric acid (together with silver, palladium and other metals) and the solution evaporated to dryness, the residue being heated, and finally extracted with dilute sulphuric acid to remove the copper.

Concentrated nitric acid is gradually added to a sample of copper bullion, contained in a covered beaker, until the material is completely decomposed. Every three grams of copper require about 14 c. c. of nitric acid (specific gravity 1.42). The acid is best added by means of a pipette whose tip is introduced between the watch-glass cover and the lip of the beaker. The solution is then evaporated to dryness on a steam bath or hotplate, and the beaker is placed on a wire gauze and heated at 450 deg. or higher, until no more fumes are vis-

ible. (The correct temperature can be obtained by having the gauze under the beaker at red heat.) The residue is then mixed with a glass rod and the heating continued for half an hour. The copper is now oxidized and all nitrates that were formed have been decomposed by the heat. Although osmium that may have been present will have been changed to the tetroxide and volatilized, its loss would occur anyway in the fire assay. The roasted material is extracted with warm dilute (1:10) sulphuric acid, and the procedure followed that was given for oxidized ores.

Copper bullion may also be decomposed by heating with concentrated sulphuric acid, or by fusing with ammonium sulphate, roasting, and then extracting with dilute sulphuric acid; but the evaporation of sulphuric acid is tedious, and the fusion requires a large excess of flux to convert all the copper to a soluble form.

Will Goldfield Stage a Come-Back?

By A. J. MOORE

Reno, Nevada, April 11.—It is customary in presenting a subject to the public, whether before readers, audience or jury, to lay the facts before them, dwelling on each in detail, and then to sum up in conclusion. In this instance I will follow the opposite course and present the conclusion first and take up the detailed facts in later articles.

No mining camp can hope to stage a come back without the discovery of new and rich ore bodies. These, in turn, can only be found by development work. For a long time there has been a line of new development work going on in Goldfield that now gives promise of opening the long sought for new rich finds. Some five years ago J. K. Turner started new work in Jumbo Extension, at that time considered a palyed out mine. The ore bodies, according to all the rules of the game as then known, had been exhausted. The result of his exploitations, however, resulted in the finding of an ore deposit that yielded over \$2,900,000. Profiting by this other companies, taking advantage of the knowledge gained, started a new line of endeavor. As a result of this one sees today the comprehensive work planned by the Deep Mines Company, and the more advanced work along the same line by the Spearhead and the Grandma and in a more concrete form the finding of an ore body in Great Bend and the cutting of a rich streak in the Crackerjack lease on the Florence, that gives promise of a production as spectacular as any in the old days of the Florence and the Mohawk.

Crackerjack's Sensational Strike.

I was the first outsider, or at least so told, permitted to inspect the new find in the Crackerjack. On the date of my inspection,

March 21st, the south drift had gone but four feet on the vein, but it showed along roof and full depth of face one of those rich streaks peculiar to the making of a very rich ore body as found in the early days in both the Florence and Mohawk. A sample taken across several inches, including this streak, gave assays of \$3,452.00. I took it myself. It is said that the ore for two feet on either side of the stringer will of itself go over \$200 a ton. The most interesting part of the situation is that the same stringer shows in a winze sunk from a crosscut fifty feet ahead of the point from which I took the sample. This gives an ore body carrying very high values at least fifty feet long and of unknown depth and 500 feet to the surface.

The Crackerjack lease, unlike some of the Florence leases, is unlimited as to depth or height. It takes everything from the surface down. Some leases cannot work below the 500 foot level; others cannot work above it. A north drift is in shipping ore, but not of such high values as the south drift nor in the winze. A crosscut on the 550-foot level is now within a short distance of the ore developed in the winze.

Should this crosscut prove the ore at that depth, and there is good reasons for believing that it will, then the Crackerjack will have in sight an ore body that will rival anything ever before opened in the Florence, and this statement is made recalling the fact that in adjacent ground the Engineer's lease took out \$1,028,597.00 and the Little Florence \$1,532,147.00 in a very short time. The average of the ore in the Little Florence, according to smelter returns, was \$193 a ton, while that in the Engineer's went \$216 a ton. This is shown by the Florence rec-

ords. The new discovery is in virgin ground and is the most important, so far, of all the strikes recently made in Goldfield.

Concrete Evidence of New Awakening.

The best evidence of the activities of the once bonanza camp is evidenced in the fact that the hospital cards taken out by the miners show 185 men now at work, as compared with only eighty three months ago. Goldfield is apt to be spoken of as a dead camp, a town of deserted stores and empty houses, but during the past three months or so every modern house in the camp has been taken and there is today a waiting list for such houses. True, there is yet any number of miners' shacks and such like habitations with the "to let" sign on them, but such are in a condition that it would be almost as cheap to build new as to attempt to repair them. Both railroads report a marked improvement not only in passengers, but in freight, particularly the latter, and freight is the backbone of prosperity.

Old-Time Prospectors Coming Back.

A high sign of the coming mining boom is seen in the return of the old-time prospector. As to just where he has been hibernating these past few years no one knows, but he is certainly in evidence again, though in most cases unattended by his old friend the burro. Today he comes back in flivver or high power machine as the case may be, but he is in evidence all over the hills. True, the prospector now plays no part in Goldfield, but with the prospector has returned his compatriot in discovery, the leaser.

On the Florence property alone there are forty men employed, of which only seven are on company account, all the others in leased ground, of which the Crackerjack and Red Hills leases employ sixteen and the remaining seventeen are divided among other leases. The latest lease on the Florence ground is that by the Sunbeam Divide, which takes in a triangle on the northeastern quarter, together with a like triangle of adjoining Jumbo ground, making in all about one full claim. This lease was granted only a few days ago.

Leases are being let on most favorable terms—that of the Crackerjack runs until July, 1924. The policy under new management seems to be quite the reverse of that of the former Lockhart regime. Florence has a record of about \$8,000,000 past production and, as a very large area of the property is still unexplored, it has great potential possibilities, particularly in view of the ore already exposed in the Crackerjack, Melan-Howard, Smith-Donald-Giles and other leases. Considering the ore already in sight and the indicated possibilities, the Crackerjack gives promise of yielding an amount rivaling that by any other lease of the past.

Florence's Exploration Program.

As the Florence company is deriving a good income from the leased ground, its work is largely of an explorative nature. An

east crosscut is being run to explore the virgin ground of the east and south portion of the property. The mine never has been explored to any extent between the 500 and the 800-foot levels. The general belief has been that the Florence ore body does not extend below the 500-foot level, but how is one to know if extended work at that depth has not been done? The work of the Crackerjack shows that at one point it does, and to what extent will soon be proved.

It is said United States government engineers reported at one time that the country now known as Goldfield was not worth prospecting and warned prospectors to keep out; but that did not deter the more adventurous spirits with less scientific knowledge from taking out \$100,000,000 from the very ground on which the danger signs had been posted. Nor when Jumbo Extension had been passed up as worked out did such opinion stop J. K. Turner from exploring and finding another \$2,900,000 and more; nor when people said Great Bend "is too soft and spongy and only pockets" did it stop him from finding another "pocket" that gives promise of being one of the biggest yet.

When people said that the only ore in Florence worth while was between the 350-foot level and the surface it did not stop others from picking up a million or two between the 350 and the 500, nor has it stopped Superintendent McCarthy from exploring deeper any more than it stopped the Crackerjack from finding a "whale" of an ore body after every one said that the Florence Divide had taken it all.

The lesson of it all is that there is always a chance to open new ore deposits so long as the hunt for it keeps up. Goldfield is certainly doing that, with the result that several good profitable showings have been made, with others in the making, while the pick and drill is working at thirty or more points of promise.

Grandma Con. to Explore New Ground.

The Grandma Consolidated Mines Company is doing much to prospect the lower levels in its property. The shaft is now at a depth of 1,000 feet, the east dipping shales have been encountered at that point. A twenty-foot sump crosscut nearing completion will provide storage capacity and when finished a plan of development to the west will begin.

There are two shale bodies in the Grandma property, one dipping from Columbia mountain direction and the other from Vindicator mountain. The west dipping shale was encountered at a depth of 898 feet and has been pretty well explored without finding anything of commercial value, though several good assays were obtained and at many points quite a body of low grade ore was cut through. Exploration work will soon begin on the east dipping shale, and to make sure that the discovery of an ore body be not confined to Grandma ground a

portion of the adjoining Kewanas Company has been leased with option to purchase. The adjoining property on the north, the Sunrise Mining Company, has been purchased, which altogether gives Grandma Mines Company an estate of goodly proportions.

Kewanas and Great Bend Prospects.

The Kewanas Company's old shaft is 840 feet deep and on any favorable development in Grandma or Spearhead is ready to continue deep work. Meantime active operations are progressing on the ground leased from the St. Ives. This comprises sixty-five acres of very likely ground. It has never been explored below the 350-foot level, but above it there has been an extraction of over \$90,000. In the early days two miners shipped two tons of ore from the surface that turned them \$30,000. The Kewanas is now developing this ground through the Merger shaft. The work is between the 350 and the 450-foot levels by a crosscut that will come in under the old workings from which the ore extraction was made during the early days. They have about 200 feet to go to reach the objective point, and are making five to eight feet a day.

Another point of development that is likely to attract considerable attention is that in Great Bend. At the time of my visit fifteen feet of ore had been opened on the intermediate level between the 236 and the 375-foot levels that is all of shipping grade. Assays run very high in spots, but the average will come up to a good shipping grade. Over fifty tons of this high grade are already in the ore bins and shipping should begin as soon as smelter and freight rates are equitably adjusted.

The new ore body is the downward continuation of a pay shoot developed some time ago and from which over \$125,000 was extracted. Owing to the angle of dip there is 165 feet of possible shipping ore between the 236 and the 375-foot levels. An assay as high as \$11,335 has been had, but this of course was from a picked sample, but assays across 24 inches will show over \$200. Nine cars of ore placed in the bins showed values of 57.64 a ton.

This ore body has been opened up under most discouraging circumstances. Water almost beyond control, cave-ins, bulging timbers and swelling shaft have all contributed to the never easy task of discovery and development.

All Goldfield interest now centers around the work of H. G. McMahon of the Crackerjack, R. C. McCarthy of the Florence, Matt Murphy of the Silver Pick, George M. Betels of the Yellow Tiger, and J. K. Turner of the Great Bend and Grandma. It is under their direction directly or indirectly that the new ore bodies of Goldfield are being discovered and developed. The comprehensive work in the Deep Mines Company and other properties will be subjects of a later article.

New Camp of Silverhorn Taking on Boom Aspects

Silverhorn, Nev., April 11.—The arrival in camp of New York capitalists has greatly increased the excitement in Silverhorn, the new silver camp north of Pioche, Nevada. These parties have acquired valuable additional interests in the district and while no statements have as yet been made it is apparent that the recent developments have made a deep impression.

Many improvements are being made around the town. A large corral is being laid out to accommodate the numerous teams which are now hauling in and out of the new district. Two survey squads are now busy and a townsite is being laid out, closely adjacent to the principal mine.

Further improvements which are now being definitely planned is the installation of a telephone line connecting Pioche with the new district and the survey for the pipe line to bring water from the springs to the new town has been completed. Townsite lots in Silverhorn are already spoken for and assigned as rapidly as they can be surveyed.

Due to the fact that the Silverhorn district is only a few months old, there has been but little development work done on the properties and practically the entire district, outside of the big mine, is virgin ground which has received practically no attention in the past. The outcrops of quartz, which are characteristic of the district, are very numerous and offer opportunities which are seemingly appreciated and which are rapidly being taken advantage of by new arrivals in camp.

Many Newcomers Getting In.

J. C. Weir, head of the brokerage house of Weir Bros. & Co., located at 25 Broad street, New York, is now at Silverhorn, where he expects to spend an extended visit. In Mr. Weir's party are Robert Mulford, Thomas H. France, Arthur N. Page, Henry W. Stahl, Edwin Weir and Richard Claus.

Robert Mulford is a prominent mining engineer of New York and a graduate of Columbia university. Mr. Mulford is particularly impressed with the Silverhorn property and has made one of the heaviest purchases of Silverhorn stock. Mr. Mulford was an associate of the late James B. Haggin, multimillionaire.

Thomas H. France is now the consulting engineer of the Nevada Silverhorn Company. Mr. France was formerly a field engineer for the Vogelstein interests and was for years on the staff of the United States Smelting & Refining Company.

William Schauss, representing Las Vegas and Denver interests, has acquired a property just southeast of the Silverhorn prop-

erty. Equipment is now en route to camp for immediate operation.

Henry Pollard arrived in Silverhorn a few days ago from Los Angeles, driving overland from the coast city. Mr. Pollard is a prominent mining man of Oatman and is looking over the district with a view of acquiring property.

The Western Silver group, which lays to the west of the Dividend group of claims, has been acquired by J. L. Bowman, C. A. Thompson and J. E. Hagel. It is understood that these parties represent prominent Pioche mining interests.

The Silver Dividend group, which lies to the west of the Silver Dale property, is owned by Carl Sampson and W. H. Pitts. Closely adjacent to this group is the Midday Silver property, owned by Elmer Middleton of Pioche. The location of this group is regarded as very favorable, being on the strille of the recently encountered high grade ore bodies of the Silver Dale Company.

One Lease Only 100 Feet Square.

On the Silver Dale property, Victor Huson has acquired a lease on a sector of the ore dike one hundred feet square. The existence of a lease upon such a small area has been responsible for a great deal of interest being taken in this part of the district. Other parties have tried to secure leases, but it will be the policy of the Silver Dale Company to operate its own ground.

W. J. Stephens has acquired valuable property in the Klondike and Silver Boy groups; in the former he is associated with "Doc" Buchanan, and in the latter group with John Reeder, deputy sheriff of Pioche.

A number of other groups of claims have recently been taken up and reliable information gives the number of new locations as being approximately 800. Mining men from Ely, Tonopah, Salt Lake City, in fact every near-by mining section, are now interested in the numerous locations which cover the district for miles around.

MAKING FINE PROGRESS AT PRINCE CONSOLIDATED.

Excellent progress is being made in sinking the Prince Consolidated Mining & Smelting Company's deep shaft, according to reports from the mine at Pioche, Nev., a week ago. Since sinking was started on the 1st an average of slightly more than four feet per day has been made. By the end of the month, the management feels confident that an average of five feet can be attained. To expedite the business of sinking, four new drilling machines have been shipped to

the mine, according to the management.

No difficulty is being had with water, it is said. The main flow caught at pumping station No. 2 is not developing more than 150 gallons per minute. Little or no water is coming into the bottom of the shaft at a depth of 653 feet and no more is expected until the permanent water level is reached, several hundred feet below. Inasmuch as in the shafts where permanent water level was reached in the older Pioche district not much of a flow was developed, the management does not expect to meet with difficulty when great depth is attained by this work of exploration.

At the same time encouraging results are being attained in preparing the company's mill at Bullionville for the treatment of the 100,000 tons of tailings said to be piled up at this place and at Dry Valley, a few miles distant. A party of Salt Lake men, consisting of M. J. McGill, Reuben May, and H. A. McMillan, have returned from a week's visit to the mill, where a force of men under the direction of E. R. Richards has been remodeling the mill before starting the treatment of tailings.

"Results of the preliminary two-day run made just before our return to Salt Lake were most satisfactory," said Mr. McGill. "Every piece of machinery was operated with a full load. The new 100-horsepower Chandler & Taylor automatic engine operated so satisfactorily that sufficient power is a certainty. During the two-day run, during which ore was run through the mill, there was no hitch.

"Within a week, during which time a few pulleys must be changed, belts tightened up and the whole mill tuned up, I feel reasonably sure that the plant will be operating three shifts per day at or very near capacity."

Remodeling of the mill was begun about two months ago under the direction of Mr. Richards, formerly metallurgist for the Chief Consolidated Mining Company, and Maurice Peterson, a flotation expert, who with others acquired a royalty lease on the Prince company's tailings dumps.

The mill is situated upon the Pioche branch of the Salt Lake Route railroad. At Bullionville and Dry Valley, which are about seven miles apart on the railroad, it is estimated there are 110,000 tons of tailings with an average assay value of \$2.20 in gold, 10.6 ounces in silver and 5.3 per cent lead.

YELLOW TIGER WELL FINANCED.

By A. J. MOORE.

Goldfield, Nevada, April 9.—General Manager Gordon M. Bettles is out with the statement that stockholders of the Yellow Tiger have responded to his appeal for funds to the extent that a good treasury is now in hand and active work will progress on the Stonewall property of the company. A

short time ago Manager Bettles wrote each individual stockholder in effect that as there were about 2,000,000 shares remaining in the treasury he would give the stockholders the privilege of subscribing for the same at a figure below that at which it would later be offered to the public. He now states that the responses to his appeal have been such that the treasury is well provided for and there is so little stock left in the treasury that it is hardly worth his while to offer the same.

He further states that the success of the campaign is such that not only will the Stonewall property start under development but work on other claims of the company may start. The Stonewall property is located about fourteen miles southerly from Goldfield and comprises seven patented claims. The company also owns the Sterlag group of six claims which are an extension of the Stonewall, and were located to cover a tunnel site and for other development work.

Only one small portion of the Stonewall main vein has been developed to date, but in that little work an ore shoot of great promise has been opened. While values only run about \$16.50 the character of the exposed ore is such as to show leaching action of the surface waters and the theory prevails that at depth these values will be added to the much higher grade ore and a very profitable orebody discovered. The company is well equipped with machinery, bunk houses, etc. The Sterlag tunnel will be driven to develop at greater depth and is expected to tap a water supply for mill as well as cut two very favorable contacts of igneous rocks with limestone. It is here that higher values are expected.

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EXPIRING OIL PERMIT HOLDERS

MAY GET NEEDED RELIEF

Senator Key Pittman has informed Nevada oil men that one of his first acts in the special session of congress which convened on the 11th, would be to put in a bill asking for an extension of time in which work should begin on oil prospecting permits. The law as it now stands particularly specifies that a suitable rig shall be on the ground within six months of the date of granting of permit. He states that he feels quite confident that congress will recognize the fact that owing to winter weather and money stringency it has been difficult for permit holders whose six months expired during the winter and spring months to have fully complied with the terms of the permit. He further states that it will be well for all permit holders whose date of starting work expires before such act is passed to make application to the secretary of the interior, asking for an extension of time and setting forth the reasons therefor.

Blue Horse Mine, Nevada, Developing Into a Bonanza

BY AL H. MARTIN

The scene of extensive developments carried forward quietly for several years the Blue Horse mine, forty-five miles east of Goldfield, has taken its place among the prominent gold-silver properties of Nevada. Controlled by a coterie of wealthy California men, the company has expended \$100,000 in developing and equipping the property, and is preparing for an additional outlay of \$100,000 in deep mining.

The ore body, ranging from eight to twenty feet wide, has been developed for a length of 1,500 feet, with the pay streak averaging six feet wide. Three cars of ore recently shipped to smelters, by way of motor trucks, netted \$280 uper ton in gold and silver, according to the management. At all points exposed the ledge shows profitable ore and sinking of a double-compartment shaft is proceeding to reach the vein-system at a depth of 500 feet.

J. W. Plant, Pacific coast general manager of the American Manganese Steel Company, and formerly general superintendent of the Natomas Consolidated Dredging Company, is president of the Blue Horse Mining Company. W. H. Bissell, vice-president and general manager of the Santa Cruz Counties Utilities, and millionaire lumber magnate, is vice-president, with Fredrick N. Lee, San Francisco accountant, secretary. The treasurer is Roy H. Elliott, assistant general manager for the Bulkeley Wells mining interests. The remaining directors are J. W. Matson, secretary and general manager of the Honolulu Plantations Company, and prominent in shipping circles, and George K. Allen, noted mine operator. The property is unique in that it has been developed to its present stage at the expense of the owners, without a cent of outside money.

The high grade vein recently opened in the Florence mine by the Crackerjack lease is generally conceded to be the continuation of the long-sought Engineers vein, which yielded millions in profits in 1908, before it faulted. Seams of bonanza ore accompanies the milling and shipping quartz, with the winze going down in excellent material. The discovery is apparently the most important made in Goldfield for many years and is claiming wide attention.

The vein was struck at an approximate depth of 500 feet in virgin ground. The Red Hills Florence and Florence-Goldfield companies are completing arrangements to seek the continuation of the ore body outside the territory held by the Crackerjack Company.

Peavine Activities Continue.

The concentrating mill of the Standard Metals Company has been placed in operation on ore from the 300-foot level and is treating about thirty tons daily. Capacity of the plant has been increased by the installation of a large flotation unit and a high metal recovery is indicated. An immense tonnage of commercial ore has been exposed on the 300 level, with grade of ore showing uniform improvement as the drifts advance. Values are chiefly in the form of silver, copper and gold, with the copper being displaced by lead and gold as developments advance. All the ore is stated to be of profitable grade, with the richer portions sampling over \$600 per ton.

The owners of the famous old Wedekind property have practically completed arrangements for the resumption of work at mine and mill. The property was a famous producer of silver and gold about twenty years ago, and considerable ore of milling grade is available for immediate extraction. The management is outlining a program of comprehensive developments, including exploration of particularly promising ground.

Along the Comstock Lode.

Stimulated by rich discoveries in old sections of the Consolidated Virginia and Ophir mines, combined with re-opening of many famous old properties and discovery of new ore deposits, the entire Comstock Lode region is apparently on the verge of a great revival. The long tunnel of the United Comstock Company, at Gold Hill, is advancing from five headings and making excellent progress. The company has blocked out a vast tonnage of commercial ore in the Imperial, Knickerbocker, Jacket and other properties, and plans to start early construction of a 1,000-ton mill.

Drifting has started from a fifty-foot shaft in the Comstock Reliance to reach the junction of the Hayward and No. 2 veins. The latter ledge samples \$5 to \$78 per ton in gold and silver, and the Hayward was one of the richest producers of the section in the pioneer days of the Comstock region. Considerable ore is exposed and the management plans early shipments.

At the Comstock Florida the ore body has been exposed for 200 feet by clearing out the Pony Express tunnel, and averages around 120 feet in width. The ore is low grade, but drifting has started on a branch vein which shows improving ore conditions as work advances. Besides the main ledge six strong veins have been exposed.

New Gold Placer Rush Is Started in Nevada

Ambrose Murphy, better known by the sobriquet of "Death Valley Murph," motored in last evening from the southern end of the county after covering over 700 miles in the course of four days, with one of the most startling stories of great wealth narrated since the days of the Goldfield rush, says the Tonopah Times, of a few days ago. Mr. Murphy brings first news of the new placer district opened in the vicinity of Johnnie in Nye county that may mean millions for the discoverers. This is a placer field of unknown extent in which he located 320 acres for himself and seven Tonopah associates. The find was made last Thursday, and when Mr. Murphy came through yesterday, the mine and mill at Johnnie were deserted as every person in the camp was busy monumenting the new gold placers.

Wedekind is Discoverer.

Robert Wedekind, the time-honored prospector and mine operator, is entitled to credit for the find. He and Frank Buol, of Las Vegas, were engaged prospecting the region when Wedekind, in sampling black sands filling the bottom of a gulch, found several rough pieces of what appeared to be disintegrated granite but which revealed the tell-tale yellow metal when washed.

Further exploration confirmed the suspicion, for panning brought to view coarse nuggets that left no doubt about the value of the strike. Locating began immediately and, soon after the news reached Johnnie, the little camp was emptied. Murphy came along at the nick of time when Buol needed a mechanic to adjust his auto and was advised of the discovery.

Find is Near Johnnie, Nye County.

The location is two miles east of Johnnie in Nye county, close to the main auto road at the southern end of Amargosa valley. The ground is well broken, being seamed with gullies, all carrying pay dirt. The prospecting had not advanced far enough for anyone to search for the main channel, but it is contended that if the side gulches are so rich the channel must yield fabulous returns. Mr. Murphy brought a small vial holding a coarse nugget as large as a pea which could not have come far as it had not lost its edge by friction.

"Death Valley Murph" was accompanied by E. J. Bahten, the founder of Greenwater, and the remarkable part of the story is that although both men are veteran prospectors neither was looking for a location. They were returning from the Avawatz mountains in San Bernardino county, where a silver property had been located some time before by Mr. Bahten, who is known throughout the southern country as "Furnace Creek."

Stampede for New Diggings.

Notwithstanding the big dust storm and return of winter over a dozen parties set out for the new placer field at Johnnie Sunday morning and others are following as fast as they can arrange to leave their business. "Death Valley" Murphy will return about the end of the week, when he will take a concentrator in with him and begin sinking to bedrock.

Among those interested in the discovery are Frank Sorenson, formerly of the Midway hotel, Percy Rupp, and Downey and Desmond. Frank M. Otto, from the Johnnie mine, was in town yesterday giving some interesting facts about that high grade district which has produced over a million from the Johnnie mine alone. The Crown Point and adjoining property yielded \$83,000 from one pocket.

ALTA TUNNEL ENCOUNTERS BIG BODY OF HIGH GRADE ORE.

A strike of unusual importance was made in the Alta Tunnel & Transportation Company's property in the Big Cottonwood mining district, southeast of Salt Lake, just a week ago. Samples of the higher grade ore assayed 76 per cent lead and 107.6 ounces silver per ton. A sample of the intermediate grade ore, flanking the high grade, is reported to have assayed 11 per cent lead and 21.6 ounces silver, while a sample of the fines collected gave returns of 29 per cent lead and 16.4 ounces silver. The ore a full face of which had been developed when the report was released, is described as being a combination of carbonates and galena, and resembles very closely the ores shipped from the old Prince of Wales mine, in the early days of the Big and Little Cottonwood districts.

The Alta Tunnel is developing at a great depth a highly mineralized formation, which on the surface was very productive in the early days of the Cottonwoods. From the old Prince of Wales several hundred thousand dollars of ore was mined in the early days by the Walker brothers. The objective of the present work has been one of the old Prince of Wales chutes which was highly productive near the surface.

At a distance of 2,500 feet from the portal a cross cut was started to reach the Prince of Wales fissure. After 550 feet of cross-cutting from the tunnel this fissure was entered. From a distance of 1,100 feet the fissure was followed in an unfavorable limestone underlying a brecciated formation in which ore bodies are generally found in

the Alta district at the intersection with northeast-southwest fissures.

Where the brecciated limestone zone, said to be from 100 to 200 feet thick, and the Prince fissure intersected a low grade ore body over thirty feet wide and twenty feet long was encountered. An upraise was started in this ore. At a height of twenty-five feet a drift was started paralleling the dip of the brecciated stratum, which is twenty degrees to the northeast. The first round of shots, according to Manager Bodfish, broke into the high grade ore.

TINTIC STANDARD GOING AHEAD; LAST QUARTERLY REPORT ISSUED

That the Tintic Standard will be able to ride along on an even keel, notwithstanding the closing of the Garfield smelter to which most of the mine's dry ore has for some time been shipped, is the statement recently given out by Manager Raddatz. He has assurance of a market for the Tintic Standard ore. Part of it, more than 150 tons daily, will go to the company's new mill, and the remainder will be sent to the United States and American smelters.

The Standard will mine carefully and ship the class of ore that is most profitable. Development work will not be slowed up to any extent, although Mr. Raddatz will likely delay work which he has mapped out for some of his other East Tintic properties. He will, however, be able to continue the campaign of prospecting at the North Beck and he is quite sanguine of meeting with success there. The work at the North Beck is being carried on at a depth of 1,600 feet.

Last Quarterly Report.

Operations of the Tintic Standard Mining Company for the fourth quarter of 1920 are reported in a statement recently issued. During the fourth quarter the company states, the following amount of underground work was done: Raises, 227 feet; drifting, 1,606 feet; square set stoping, 888 sets. The statement continues:

"Ore shipments for the fourth quarter of 1920 amounted to 26,697 dry tons, with a gross assay content of \$1,306,880.78. Smelter deductions and treatment charges were \$562,001.81; freight, \$85,854.20; mining development work and improvements, including expenses on the new mill, were \$327,136.62, leaving net to the company for the fourth quarter, \$33,188.15.

"During the fourth quarter for 1920 two new bunkhouses and a three-compartment mill ore bin were completed. Work on the new mill was pushed as fast as adverse labor conditions would permit, and on December 31, 1920, was 80 per cent completed, while on the date of this letter, April 2, 1921, the mill is working at full capacity in every department, proving itself most efficient and successful in every way."

Silver King Posts Dividend; New Mill Plans Approved

Important business affecting the local mining industry was transacted at the meeting of directors of the Silver King Coalition Mines Company, held in Salt Lake on the 7th instant. First, a dividend of 15 cents a share, aggregating \$182,415, was posted. This disbursement brings the total dividends to date to \$15,380,975, while the company's treasury reserve is said to approximate nearly \$1,000,000.

Officials of the company felt that while the large surplus held by the company in the treasury might justify in more favorable times a larger disbursement, with the metal market in its present chaotic condition conservative action, in the course of time, will be of greatest benefit to the stockholders. Those of the directors most fully informed of the status of metals feel that within sixty days action will have been taken by congress which will make it possible for producers of lead to operate at a profit.

Plans for New Mill Approved.

At the same meeting tentative plans for the construction of a new mill at Park City to replace the old concentrator, destroyed by fire a couple of months ago, were submitted for approval. Following their acceptance the officers were directed to advertise for bids on a steel milling plant with a capacity of 450 tons a day, the estimated cost of which approximates \$200,000.

Character of Plant is Decided Upon.

The flow sheet which has been prepared for the mill provides for the treatment of ore with jigs, tables and flotation. Under-size material from the jigs and crushers and jig tailings will pass through rolls and be concentrated on tables. Table tailings are to be crushed, it is said, in ball or roller mills for the flotation cells. Ore bins will be partitioned for oxidized and sulphide ores.

According to present plans, the new mill should occupy only about half the space covered by the old plant. As the foundations of the plant were not injured by the fire it is thought that considerable labor and expense can be saved the company in the construction of the new mill by making use of the masonry still intact.

About twenty-five men are at work, under the direction of Mill Foreman John A. Tallon, in clearing the wreckage of the recent big mill fire at the Silver King Coalition property. Weather permitting, cement work will be commenced at the upper portion of the millsite April 15, and by the time the cement work is finished at the upper portion the lower portion will be cleared of the heavy ruined machinery and immense amount of twisted iron and debris, and then

everything will be in readiness for the work of construction.

Company May Enter Oil Field.

Some of the directors of the company have given considerable attention to the advisability of acquiring oil lands for exploration. Although no definite action was taken at the meeting with regard to the acquisition of an oil prospecting permit on a southern Utah structure, W. Mont Ferry, managing director of the company, authorized the statement that directors of the company are fully alive to the importance of development of oil production in the state, especially with the metal market in its present condition.

The fund of knowledge possessed by Mine Manager M. J. Dailey, who has had considerable experience in the development of oil lands in Cuba and Mexico, it is felt, will be no small asset to the company should decision be made to start the prospecting of an acreage on a southern Utah structure.

IMPORTANT STRIKE RECORDED IN SILVER KING CONSOLIDATED

A strike was made in the Silver King Consolidated company's mine at Park City about two weeks ago, which promises to disclose ore bodies of magnitude and worth such as the management has relied upon encountering ever since the Spiro tunnel was started. Within a day after encountering the ore the showing widened from twelve to thirty-six inches. The first samples of the ore brought down by Consulting Engineer Harry A. Lee gave returns of sixty-two ounces in silver, 36 per cent lead, 12.98 per cent copper and \$2 in gold. The strike was made in the Park City limestone formation, the formation in which many noted ore bodies in the Park City district have been developed throughout the years of the famous camp's activity.

Officials of the company are highly elated over the discovery, because it justifies a \$500,000 deep development campaign, the driving of the Spiro tunnel, which was undertaken entirely on the theoretical geological work done by Mr. Lee more than five years ago. The Park City formation, in which the richest and largest limestone ore bodies of Park City have been found, lays at considerable depth in the Silver King Consolidated property.

The ore channels that have produced millions of dollars in the Silver King Coalition were projected through the property and the Spiro tunnel development launched. The tunnel was started in August of 1916 and despite the most adverse economic conditions brought on by the war the company

kept the tunnel work going steadily. The tunnel is now in a distance of 15,000 feet. A big dike, the McGregor, bounds the south limit of the territory in which development work had been done. When the Spiro tunnel reached the McGregor dike upraises were started north of the dike at places where the ore bearing fissures had been cut. The tunnel at these points was in the Weber quartzite, which is below the ore bearing Park City formation.

The strike is in what is known as the "Contact" raise in a drift which was started at 180 feet above the tunnel level. The raise, which is 13,575 feet from the tunnel portal, had gone up approximately 250 feet following some fissures which petered out. The drift at the 180-foot point was then started to follow a slip.

At 110 feet to the southwest from the raise the ore was encountered, and as it is being followed the size of the shoot has enlarged. The find is in direct line to the southwest from the large Silver King ore bodies, and Mr. Lee says that there are four ore channels in the newly opened area to be explored.

The ore was opened with less than 500 feet of prospecting, and 110 feet from where it was projected, Mr. Lee said. Another raise has been started south of the contact raise at the McGregor dike.

The Spiro tunnel has crossed the dike where it is in the Park City formation, and specks of copper are being encountered. This is also very important, as it is the first time the Park City formation has been opened south of the dike. In the Thaynes limestone, above, the company had large ore bodies, so that the showing of mineralization being encountered indicates that the ore channels will be found productive at depth, giving the company a large area of virgin ground to explore.

MEXICAN MINING INDUSTRY PARALYZED.

The mining industry of Mexico is practically paralyzed by the present low prices prevailing for both silver and lead, according to Frank C. Morehouse, consulting engineer for the McQuatters corporation of New York city. Mr. Morehouse returned recently from Mexico after a three months' stay. With foreign silver selling around 50 cents, and lead at 4 cents, the mining situation in Mexico is for the present hopeless.

While in New York last week Mr. Morehouse was informed that all of the American Smelting and Refining Company plants would be closed down immediately. The 1,500-ton plant of the Alvarado Mining and Milling Company, of which the McQuatters corporation is said to own control, has also been closed, according to Mr. Morehouse.

Oil Well Operations Outlined for Uninitiated

The Price, Emery county, Sun deems this a proper time to give a little explanation of the work of making an oil well, taking its cue from the questions that flooded the workmen around the derricks on the occasion of the recent excursion from Salt Lake to the fields, and while not writing for the information of the insiders, it will try and give its readers who have not been around oil wells something of an idea of the method and apparatus used in the work.

"Spudding in" may, for all practical purposes, be considered as the actual beginning of drilling the hole or well, and a "standard rig" may be understood to carry the idea of a certain arrangement of machinery, tower, engine and general working apparatus, as distinguished from rigs of a portable or more or less temporary character.

Method of Starting Work.

The usual method of starting a well is to dig a pit about eight feet square to a depth equal to the length of the tools used—something like twenty-five feet, and this is curbed up much like a mine shaft. The hole—or well—is drilled in the center of this pit, and the size of the hole depends on the nature of the ground, the depth to which it is expected to drill, and other conditions.

The drill used is a piece of steel of the desired diameter, and its length is generally about four or five times its diameter. The drill is fastened to the bottom of a stem of smaller diameter and twenty feet or more in length, the top being attached to a heavy rope. This drill has a suitably shaped point, and with the stem for a sixteen-inch drill, will weigh something over two tons.

Hanging in the hole at the end of a rope having a diameter of nearly three inches, the drill is lifted up from the bottom of the hole about two or three feet, and dropped down again, and this action, which is accomplished by a "walking beam" operated by the engine, repeated about twenty times a minute, breaks the rock under the drill point into a powder. A quantity of water is kept in the hole, to a depth of perhaps ten feet or more, and this mixes with the powdered rock, making a slime, and from time to time—at intervals of about two hours—the drill is hauled up out of the hole, and a bailer lowered and the hole is emptied of the slime, and a fresh supply of water placed in the hole with this same bailer before drilling is resumed.

The bailer is a long slim bucket of somewhat smaller diameter than the drill being used, arranged with a valve in its bottom which opens when a bailer hits the bottom of the hole, allowing the slime to rise

in the bailer. The valve closes as the bailer is lifted from the bottom, holding the slime and where a suitable sluice carries it away from the well.

Other Features of Business.

The tower built over the well is used for the hoisting operations in handling the drill, the bailer and the iron pipe or casing which is driven down to line the well as drilling proceeds. Three separate hoisting winches are provided for these operations—all operated by the same power—which is a steam engine of about twenty-five horsepower.

A crew of about fifteen men is required where one drilling shift is maintained, as the men must be fed, kept in materials needed, fuel hauled for the power production, and so on. A supply of tools, piping, ropes, drills and emergency apparatus is kept around.

Sometimes the drill or other tools are lost in the well, and a long and tedious fishing job may be required to recover them, or even in some cases the well has to be abandoned.

A study of the material brought up in the bailer indicates the nature of the strata being penetrated, and when the oil producing layers are reached it is customary to "shoot" the well, in which operation a metal can filled with nitroglycerine is carefully lowered to the bottom, and a "go devil"—a heavy iron bar—is dropped down on it, the resulting explosion breaking up the ground around the bottom of the hole and opening the way for an easier access of the oil into the well.

COMPANY TO DRILL FOR OIL CLOSE TO KEMMERER, WYO.

With the arrival of Colonel A. G. Burritt, president of the Consolidated Producers, Ltd., and C. L. Boyle, a director of the company, in Kemmerer, comes the announcement that an oil well will be spudded in within a few days at a point just four miles east of Kemmerer, on a 320-acre tract of state land leased by the company, and described as the NW¼ sec. 16, twp. 21 N., R. 115 W., says the Kemmerer (Wyo.) Republican of recent date.

This is Colonel Burritt's first visit to the Lincoln county oil fields since last fall, while Mr. Boyle comes from Spokane, this being his first visit here. The Consolidated Producers is composed mainly of Boise, Idaho, parties, and is organized under the laws of that state. Colonel Burritt, who is a geologist of note in the west, is president of the company, while J. R. Smead of Boise is vice-president, and J. L. McNair of Salt Lake

City is secretary. Dr. F. R. Davis of Rancier, Oregon, is a director.

The company secured their ground from the state last year, and before winter set in had spotted a No. 28 Star rig, as well as cabins, and when the first snow fell had a first class camp all ready for occupation, but it was deemed more expedient to await the coming of spring before beginning. A crew is now in the camp, headed by Charles Nelson, a driller from the Casper and other Wyoming oil fields. Spudding will be in order just as soon as everything can be gotten into readiness, and probably will be the first of next week.

All of the officials are enthused over the outlook. Mr. Burritt chose the property and drilling site with great care, and believes that the oil sands will be encountered at no greater depth than 1,500 feet. The well site is at the top of the Aspen formation, on the west flank of the meridian anticline.

Mr. Boyle is not a stranger in Wyoming, as in the past he has handled a number of large oil and mine deals in the state.

The new well will be drilled on what is termed a very promising structure, and is directly east of Kemmerer, just over Oyster ridge, and a great deal of interest is centered in the outcome of the company's activities.

IRON ORE SMELTING SOON TO BEGIN IN NORTHWEST

Spokane, Wash., April 11.—Four or five carloads of pig iron a week will be coming into Spokane before the summer is over, or in the early fall, if the plans of the Northwest Iron & Steel Company of Spokane mature.

"This plant will have an initial output capacity of twenty-five tons a day, and will be enlarged as development proceeds," said Attorney Fred M. Williams, president of the company, at its office in the Rookery building, Spokane. "There is no iron furnace on the coast north of California, so it is easy to understand the importance of this enterprise and the opportunity for developing an industry of great importance. The consumption of pig iron on the coast is 500 tons a day.

"The important requisite to success in this enterprise is sufficient high grade iron ore with ample electric power and a sufficient supply of other material. All these are at hand. We have 300 acres and a ledge sixty feet wide that has been traced 4,500 feet. The ore carries 63 per cent metallic iron.

"We will use the electric process, which makes the finest and purest pig iron. There are two or three sources from which we will be able to secure ample electric power. Charcoal is important in this process and we have an ample supply of larch and fir for this. Twenty men will be employed shortly. The plant will be at Leadpoint, ten and a half miles from Boundary."

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*Illustrated.

According to a Salt Lake engineer a thousand feet of lumber that could be bought in the Northwest two weeks ago for \$10.50 would cost \$18 more, as freight charges, to have it delivered here. No wonder that building operations are at a standstill.

There is said to be a plot on foot among counterfeiters to emit a flood of bad bills in California, according to the San Francisco Commercial. The most common scheme is to raise the numerals, and thus make \$10 out of a \$1 bill or \$50 out of \$5. All people should be careful to examine paper money for the purpose of detecting frauds.

THE SITUATION AND OUTLOOK.

With the closing down of practically all of the big copper mines, mills and smelters of the western mining states since the first of the month; with the railroads serving the West releasing thousands of employees and still demanding exorbitant freight rates; with building activities at a practical standstill, and with merchants everywhere at their wits' ends to know what to do, the situation confronting the surrounding region certainly has taken on a gloomy aspect.

Strenuous efforts have been made for months to stave off the inevitable—the situation now existing—but without avail. It just had to come. There is nothing to be gained in dwelling on conditions responsible for this final crash. Every person able to read knows what they are, for full and frank explanations have come from authoritative sources from every direction. The past is dead; “let the dead past bury its dead.”

What concerns us now is: “What of the future?”

Every red-blooded American in the West is already “peeling his coat” in preparation for the “full speed ahead” drive that he knows must soon begin. The fact is appreciated, of course, that the copper branch of the metal mining industry will be slow in regaining its equilibrium; that markets must be found and developed for the enormous accumulation of copper with which this country is surfeited. The task is a herculean one; but never fear—it will be accomplished.

In other lines of mining the situation is less tense. Silver is commanding nearly a dollar an ounce; the price of lead is beginning to show improvement and the opinion prevails that zinc will gradually advance along with lead as the wheels of industry acquire momentum. Efforts are being made to keep the lead-silver mines working and the smelters which treat this class of ores in operation. There will certainly have to be some readjustments made in freight rates and smelter charges before the lead-silver mines can be operated at even a modest profit; but mine managements are reluctant to close down the mines entirely pending the threshing out of the problems confronting them. They now are running under reefed sails, so that any menacing surplus of either lead or zinc—real or fancied—must soon be reduced to a minimum.

Gold mining is receiving renewed attention. Prospectors and idle miners are already seeking new fields and old properties wherein they may find profitable employment. From Alaska to Mexico the search is on and occasional fragments of news finds its way into print which indicates that these efforts are being rewarded. New silver-bearing ledges also are being exploited in various sections and the undertone of sentiment all seems to favor an early return of

activity and a possible boom in metal mining.

Then, again, so far as Utah is concerned, the remarkable interest and activity being displayed in the efforts to prove up the oil fields of the state by the world's mightiest oil corporations, accompanied by the no less enthusiastic efforts of numerous independent concerns, makes the future take on a still rosier hue. In fact, we are assured by eminent geologists that Utah has most unusual possibilities in the matter of petroleum production and, as we already KNOW that we have limitless deposits of oil-shales that must eventually yield billions of dollars worth of oil, the people of this region certainly can view the immediate future without alarm.

“Now! altogether! Let's go!”

F. E. Mariner, president of the Penscola Tar & Turpentine Company, passed through the city Monday on his way to Cobalt, Ontario, from his home in California. “While our plants have been doing little for some time,” said Mr. Mariner, “we are confident that the worst is over and that business conditions will show steady improvement from now on. There has been no escape from prevailing conditions and men of foresight, who have taken the time and trouble to keep in touch with the situation as it has developed have for most part, I believe, fortified themselves to weather the storm. Everything will work out all right and within another year I am confident that we shall be forgetting the period of rough sledding we have had to face.”

“Stick to the job you have,” says one of our exchanges. Several thousands of men who have been laid off during the past month will fail to see the logic of that admonition.

MAY RESURVEY SHALE BELT.

A movement has been started in Colorado to secure a resurvey of thirty townships in Garfield and Mesa counties, on account of the errors in the former survey, and the rapid increase of land values in the shale belt. The movement was initiated by Captain Robert DeBeque, through the Denver office of the U. S. surveyor general for Colorado. The Colorado state senate has passed a joint resolution, introduced by Senators Girard, Bannister and Callen, to be forwarded to the special session of congress. All shale men are urged to write their senators and congressmen, requesting their cooperation. If early action is taken in Washington, it is possible to get the resurvey started and the principal lines run this season.

The world's stock of cut diamonds is estimated at 85,000,000 carats.

World Conditions--and Oil

By ROGER W. POWERS*

With the entrance of the United States into the world war, the country experienced a condition without parallel in its history. From the man of humble ambition to the merchant prince an opportunity for personal enrichment was presented beyond the wildest hallucinations of an extraordinary dreamer. Fortunes, so-called, were made over night; labor demanded and received a wage far greater than ever secured before; factories accustomed to working on an eight-hour basis trebled their forces and new industries were born with the rising of each sun. Man power was scarce, production, at best, limited to the enormous demands of the world which was crying constantly for more.

Then came the armistice and with it the realization that men and chattels were no longer to be fed to appease the appetite of a greedy God of Destruction. For a time industries continued at their terrific pace, as does a high powered racing car continue through natural momentum with the power shut off, but the demands of war were no longer felt. Markets became stocked with goods and credits were strained. Millions of soldiers returned from the field of destruction and sought employment once again in their own locality. Unrest became apparent, not only in this country, but in the European nations, and the high powered racing car slackened its speed until it wavered and stopped.

For the last eight months the United States has been going through a period which has been termed constructive. By some it has been called "destructive," but as a ball that has been tossed into the air must, through the natural forces of gravity return to earth, just so necessary was it that the world return to its ordinary course of existence.

The "Bugaboo" of Fear.

From a feeling of intense optimism there surged over the people a wave of uncertainty tinged with pessimism and that pessimism was not altogether unusual, for the country saw before it an empty mart of trade. Men asked each other a question that none could apparently answer and with the never-ending round of questioning the uncertainty grew. The war instead of making us brave and courageous had left us afraid of the future. In the minds of some there existed a great "bugaboo," the size and shape of which could not be explained—its methods of attack obscure and its vengeance uncertain. That "bugaboo" was fear. But the world has gone on. Progress has been impeded by obstinate tactics adopted on the

part of capital, by bull-dog refusal to meet conditions on the part of labor and by an actual retrenchment on the part of the buying public of the world.

Today we see and understand the future that eight months ago was hazy. We know that that "bugaboo" called fear exists within us and we have learned to master that fear. We know and understand that conditions, as hard as they may be at best, have reached almost their lowest ebb. We know and are prepared to meet a period of comparative hard times which will exist for some time to come and we know, too, that in the end a better understanding will spring up between individuals and nations.

Crude Oil Prices at Bottom.

Adverse conditions have effected every branch of the world's industries, not excepting petroleum. Since the first of the year we have seen a marked improvement in several lines of endeavor, but it is only since that time that the oil industry has experienced its slump in the price of crude products. Practically every field throughout the country, with the exception of California, has suffered a deep cut in price.

California being located in an isolated spot in relation to the rest of the producing states, has been able to maintain a level keel of prices. In the opinion of the writer, it may now be safely stated that the bottom has been reached, so far as the oil industry is concerned. There may be a slight fluctuation in price, but the producer may now be assured that there will be no further drastic cuts.

While it is true that we are today producing more oil than ever before, it is nevertheless true that there exists an actual demand far greater than the available supply. It may, therefore, be reasonable to expect that before the close of the present year, crude prices will rise to a higher level than those maintained during the so-called boom period of 1919-20.

During the period from 1916 to 1920, crude oil storage was reduced nearly 50 per cent. There has been a steady drain on surplus oil since 1915. In spite of the enormous oil production for the year 1920, the world shortage was not materially decreased. This in spite of the fact that 75,000,000 barrels of oil were added to the world production in that year.

The law of supply and demand effects the oil business as it does any other line of endeavor. Due to retrenchment in many lines there is a temporary over-supply of oil for immediate needs, but upon the return of business to a stable foundation, the storage will be found to be by no means adequate to supply the intense demands of commerce and trade.

Future of Industry is Assured.

Statistics show that for twelve months ending December, 1920, 34,000 wells were drilled in the various fields of the country. This total exceeded by more than 5,000 the number of wells drilled in 1919, which was considerably in excess of the number drilled the year previous. When it is considered that a vast portion of the new completions came from the fields of Texas and Louisiana where flush production is of short life, there is then the firm realization that vast new pools must be opened within the coming years to offset the lack of production in those districts.

In spite of the intense reduction in price, oil is still being produced at a good profit. In the Mid-Continent field producers were receiving during 1918, \$1.50 per barrel. Today these producers are receiving \$2 per barrel, which, taking into consideration the increased cost of labor, still leaves an average of approximately 25 cents per barrel in excess of prices paid before the war.

The final analysis is, therefore, that the future of the industry is safe and recommends itself to the hearty co-operation of investors far and wide. The pessimist of the industry can himself see no further reductions, while for the optimist realization that for those who dare opportunity extends her welcoming hand.

ENGINEERS' BANQUET A GREAT SUCCESS.

At the "get together" banquet of the Engineering Council of Utah, given at the Hotel Utah Monday evening last, it is claimed that never before in this state was any gathering of technically trained men so solidly represented at one function. Among the approximately 500 men in attendance all of the engineering societies of Utah were represented and there was a gratifying representation of unaffiliated engineers and high public officials, as well. The great banquet hall was so permeated with a feeling of good fellowship and enthusiasm that every participant just naturally felt at home the moment he entered the room. And that was what the gathering was planned to accomplish.

The speakers of the evening included Governor Mabey, who created much enthusiasm in his address on "The Engineer and the Commonwealth;" Prof. R. R. Lyman registered "a ten-strike" in his discussion of "The Value of Technical Training," while Chas. M. Woods, an architect of Ogden, injected life and humor into the proceedings through his Swedish dialect reading, aided by a trio of Ogden engineers who impersonated a Swedish band. Mayor Clarence C. Neslen also contributed to the general good feeling by telling some good stories, which he followed by describing the engineering

*Managing head of the R. W. Powers Interests, an independent oil operating concern in Texas, California, Wyoming, Utah.

Construction Notes

Kemmerer, Wyoming, is making preparations to pave a portion of the town's business district. Bithulitic method of surfacing has been decided upon.

According to news emanating from camp the United Comstock Company, at Gold Hill, Nevada, is contemplating the early construction of a 1,000-ton milling plant.

Installation of power drills and compressor plant is contemplated by the Comstock Superior Company, at its Virginia City, Nevada, mines. Offices are at 446 Gazette building, Reno, Nevada.

Bids are now being called for the construction of the Silver King Coalition Company's new \$200,000 milling plant at Park City, Utah. Main offices of the company are in the Kearns building, Salt Lake City.

Work was commenced on the 1st under the direction of Villadsen Brothers, contractors, on the construction of a distributing plant for the Dodge Brothers Automobile Company of Detroit, Michigan, in Salt Lake. The structure will cost approximately \$150,000.

Of the \$40,000 in bonds voted by Wasatch county for school purposes, \$33,000 has been set aside for a new school building to be erected at Soldier Summit. Plans and specifications are being drawn and it is expected that actual work will begin within the next thirty days.

The Rice Mining and Milling Company, operating the Mother Lode claim in Big Creek, twenty-eight miles from Elk City, Idaho, has received machinery equipment, including mine cars, electric plant, air compressor, machine drills, etc., and contemplates a reduction plant of sixteen tons capacity every twenty-four hours. The ore is free milling, with small sulphuret content, and can be satisfactorily treated at the mine. A hydro-electric power plant with capacity for a 500-ton mill will be installed later.

Forest Supervisor C. A. Beam of the Wyoming National Forest has received official advices that the proposed paper mill project at Idaho Falls, Idaho, had been successfully financed and was now assured. The new mill will bring about "timber sales" on the Targhee, Teton and the Wyoming National forests, the latter in Lincoln county. The initial outlay for the mill is \$5,000,000, all of which has been raised. This will be the first paper mill in the intermountain district, and will be one of the largest in the United States.—Kemmerer, (Wyo.) Republican.

Work has been resumed at the mill site of the Consolidated Spanish Belt and pouring of concrete in remaining forms has been started.

Coal Notes

The Chinook Coal Company, operating on the Spokane Indian reservation near Detillion bridge under the management of H. J. Shepard of Spokane, has resumed work. The mine shaft has reached an incline depth of over 200 feet, cutting several veins of coal of good grade.

According to A. D. Pierson, general sales agent of the Utah Fuel Company, the item published in the last issue to the effect that the movement of coal over Soldier Summit from the Utah coal fields was about 80 per cent of what it was last year, is erroneous. The amount is only about 45 per cent instead of 80.

The appointment of H. I. Smith, mining engineer with the Bureau of Mines for many years, as district engineer to supervise coal leasing operating regulations, has been announced. His headquarters are to be at Denver. The principal duties connected with the post are investigations of coal and shale mining conditions on properties coming under the leasing law.

Reports on coal mining activities just now are that the Kemmerer district is enjoying greater prosperity than its sister fields over the state. Some time ago there was a slump in coal mining throughout the country, some of the places being hard hit. A report shows that the average number of days worked in the Kemmerer district are four each week, while in Sweetwater county the average is only two.—Kemmerer (Wyo.) Republican.

Several changes have been made among the officials of the Union Pacific Coal Company at Rock River, Wyoming, and at Reliance, the changes being effective on Monday, the 4th. Tom Foster is the new superintendent at Reliance, relieving J. J. Traher, who resigned. Mr. Foster formerly was mine foreman at No. 7 mine, Rock Springs, and has been with the company for many years. He served one year as mine foreman at Reliance and is familiar with the mine at that place. Mr. Foster's position as mine foreman at No. 7 has been taken by Tom Overy, who was assistant foreman at No. 4 mine.

Coal production in the state for the first three months in 1921 shows a decided decline, amounting to from 40 per cent in January to more than 50 per cent in March, as compared with the first three months of 1920, according to estimates made by the mine inspection department of the state industrial commission. The estimates are based on the weekly reports of the operating companies, and, although two or three companies failed to report regularly, these were the smaller firms, and the estimates can be considered reliable, in the opinion of the department heads. The tonnages of production for the first three

months in 1921, are: January, 356,200; February, 322,688; March, 284,573. The production for the first three months in 1920 was: January, 589,668; February, 515,214; March, 527,606.

BIG COAL FIELD VIRTUALLY UNTOUCHED.

The San Juan Basin, in northwestern New Mexico and the adjacent part of Colorado, contains a large amount of coal of good quality. At several places where shipping facilities are available, such as Durango, Colorado, and Gallup, New Mexico, this coal has been mined for many years, and the number and thickness of the beds are well known.

In much of the basin, however, the coal is virtually untouched, and as only rapid examinations of the beds have heretofore been made, little has been known regarding their exact distribution and value. This want of information has recently been supplied for the part of the basin that lies in middle and eastern San Juan county, New Mexico, by a survey made by C. M. Bauer and J. B. Reeside, Jr., of the United States geological survey, department of the interior.

In San Juan county there are two distinct formations that contain coal beds. The beds in the lower or older of these formations are less persistent and thinner than those in the upper formation, but the coal is of somewhat better quality. This older formation crops out in a belt that extends diagonally across the western parts of the county, but only a part of the outcrop was examined.

The upper or younger formation, which contains thick beds of excellent coal in the northern part of the county and thinner beds of somewhat poorer coal in the southern part, crops out in a belt that makes a great curve from the north side through the center of the county to its southeast corner.

This formation alone is estimated to contain 10,000,000,000 tons of coal in workable beds at depths of less than 1,000 feet beneath the surface. At depths between 1,000 and 2,000 feet there is probably as much more. If to these figures there should be added those representing the quantity of coal in the beds of the older formation and those representing that in the younger formation at depths greater than 2,000 feet, the estimated amount of coal in San Juan county would reach an amazing total.

The lack of shipping facilities for this coal and the strong competition it would have to face from coals mined nearer the markets make its extensive development in the near future improbable, but it is nevertheless an immense reserve of fuel for the future use of inhabitants of the agricultural district along the San Juan river.

Around the State

Announcement made by officials of the Ontario Mining Company that owing to the closing of the Garfield smelter it would be necessary to cease production, but that development operations would proceed as usual.

The Tacoma smelter of the American Refining and Smelting Company, announced a reduction of 40 cents a day in wages beginning April 1. The new minimum will be \$3.20 a day. Seven hundred and fifty men will be affected.

Governor Charles R. Mabey issued his proclamation annulling the certificates of incorporation of about 600 corporations in the state who have failed to pay the license tax imposed upon them by the law and they legally cease to transact business in the state.

Superintendent Andy Hurley, of the Keystone, informs The Record that a force of men keep at work at the property doing development work and ore conditions are good, but no attempt will be made at marketing the product until improved market conditions exist.

Henry Barney's force is making very good headway with the raise which is being driven out at the Tintic Drain Tunnel property. This raise, being driven near the face of the tunnel, is now up a distance of 500 feet, all of this work having been performed since the first of the year with but one shift.

It is reported by the management of the New Quincy that eight inches of high grade silver-lead ore, assaying 60 cents in gold, 76.9 ounces in silver and 40.9 per cent lead, have been opened up in a winze sunk from the 700 level of the mine. Not enough work has been done to prove definitely whether a large body of ore is being entered.

The work of sinking the main working shaft of the Prince Consolidated Mining & Smelting Company is progressing nicely, according to information received from the property at Pioche, Nev., by M. C. Godbe, general manager. The shaft is being deepened in order to explore the mineralization which has been proven to exist in the lower formation by diamond drilling work.

H. D. Hanson, president of the Consolidated Woolen Mills Company, asserts that the report from Pocatello, Idaho, which stated that he had arranged for the purchase of the Golden Glow mine near Hailey by Salt Lake capitalists, was altogether incorrect. Furthermore, Mr. Hanson states that he has no knowledge of either the mine or the deal described.

In the case of the Utah Apex Mining Company, an action in the United States district court involving lateral rights to ore bodies, plaintiff was granted an extension of thirty days to review an accounting sub-

mitted by the Utah Consolidated Mining Company several weeks ago. The accounting shows that the Consolidated owes the Apex concern \$600,000.

A number of Tintic mining companies have been notified by the American Smelting & Refining Company to discontinue ore shipments to the Garfield smelter. The principal properties affected are the Tintic Standard, Eagle and Blue Bell and Victoria. The Garfield plant has been handling dry silicious silver ore. Closing of the Utah Copper will withdraw from the smelter the big tonnage of iron ore which was mixed with the silicious silver ores in making the furnace charge.

The Richfield Mining & Development Company, capitalized at \$150,000, filed articles of incorporation with H. E. Crockett, secretary of state. Shares are to have a par value of \$1. The company takes over at an agreed value of \$15,000 mining claims in Cassia county, Idaho; Grant county, Oregon, and in Sevier, Wayne and Piute counties, Utah. R. Garn Clark is president; G. Wallace Hanks, vice president; T. R. Gledhill, secretary; J. J. Steiner, treasurer, and L. Spencer, manager.

SILVER STATE CHEMICAL CO. RAPIDLY ROUNDING OUT PLANS

Following his recent visit to Salt Lake, W. A. Zimmerman, secretary and business manager of the Silver State Chemical Company, was interviewed on the subject of his company's activities by the Humboldt Star of Winnemucca. He stated that orders had been placed for building material and that five carloads of lumber, structural steel and iron, cement, etc., would be shipped there as soon as the orders could be filled.

At the site, located just east of the city, a crew of men is at work digging the trenches for the foundation of the first building of the large ore reduction and chemical plant to be constructed by the company. This building is to be 90x128 feet, and, with the exception of the roof, will be built entirely of concrete. Also at the building site a well is being sent down. This is to be dug by hand to the water line and from there drilled to greater depth. It is the intention to send the well down deep enough so as to procure at least 200,000 gallons of water per day.

Mr. Zimmerman said that the company was getting prices and placing orders for machinery which will arrive here as building operations proceed.

A lease for a strip of land 150x1,000 feet to be used for sidetrack and warehouse purposes has been signed up with the Southern Pacific Company. This land is along the railroad right-of-way and adjoins the company's building site.

The first unit will be the greatest cost

to the company of any of the buildings of the big plant, for it will contain the driving machinery, grinding and pulverizing mills. Other units of the plant will be constructed shortly after the main structure is completed and as the business of the company demands.

BEAD LAKE GOLD-COPPER WILL CONSTRUCT TRAMWAY.

Spokane, Wash., April 11.—Hope that work on the new mill of the Bead Lake Gold-Copper Mining Company, operating in the Newport district, Pen d' Oreille county, will be completed and the mill started in the near future was expressed by President George C. Geisler in his annual report to the stockholders, which was recently sent out. The report shows that the company expended \$71,979 so that a balance of \$1,932 was on hand the first of the year. The following officers were elected: George C. Geisler, president; C. C. Witt, vice-president; W. E. Allen, secretary-treasurer; C. H. Curtis, superintendent, and A. B. Babb, director. Mr. Babb was elected in place of A. C. Dukelow. In his report President Geisler says in part:

"We have at present 70,000 feet of logs on the rollway at the sawmill to be sawed for retimbering the shaft on the Conquest and for building the aerial tramway, ore bins, etc. During the last year we have built, in addition to the concentrator, a six-room house as a residence for the superintendent and an office.

"Since the last meeting we have completed between 500 and 600 feet of tunnel work in the east tunnel besides doing the assessment work on all claims not patented. In doing this work we encountered some ore, but still have more work to do before reaching the main ore shoot in the east tunnel. A shaft will be sunk at least 200 feet on the Comstock property in the near future."

PHILIPPINE MINERAL OUTPUT.

The mineral output of the Philippine islands is now valued at approximately \$4,000,000, which represents an increase of nearly \$1,000,000 over the figures of two years ago. While the increase is not notable, it is nevertheless significant of a growing activity in the mining enterprise—an industry long neglected.

Of the mineral resources of the Philippines gold heads the list in the value of output, as much as over \$1,000,000 of this metal being produced yearly. Coal comes next with an annual output of over \$400,000. Iron abounds, but is very little exploited today.

feats that were doing so much to benefit and beautify Salt Lake.

Hylon T. Plumb, chairman of the Engineering Council, discussed the aims of the organization and W. R. Armstrong, chief engineer of the Oregon Short Line railroad, described the life of the pioneer road builders, and the Rev. J. Sherman Wallace's address, "Building for a Future," pointed out the necessity of building well spiritually, so that the individual might achieve character, to the enrichment of the world.

Sidney J. Jennings, vice-president of the United States Smelting, Refining & Mining Company, spoke interestingly on the value of the Pittman act and its importance to the silver mining industry, without which, he declared, the silver mines could not operate under prevailing conditions.

Lafayette Hanchett presided as toastmaster and kept the ball rolling in splendid fashion from beginning to end of the festivities.

The committees having the affair in charge were deserving of all the good words expressed and when it came time to adjourn the sentiment was unanimous that much had been accomplished in cementing the friendships of the various engineering societies of the state and in starting the recently organized Engineering Council on its career for good in a fashion that would surely yield results.

Idaho Tungsten Mines Will be Rejuvenated

J. R. Murphy, an experienced mine manager, is in Salmon making preparations to open up the famous deposits of tungsten on Patterson creek, this county, says the Salmon (Idaho) Herald. These deposits comprise the largest and richest known commercial body of tungsten ore in America, and during the war the federal government undertook to acquire them for the use of the nation; but prior to conclusion of the transfer the armistice was signed. The property consists of some thirty patented claims—almost a square mile—in one of the richest mineral zones of Idaho. For fifteen years its former owner, the Ima Consolidated Mining Company, carried on work of development, shipping a considerable quantity of ore, and the last working was under a lease operated on a royalty basis, during the life of which they marketed a great amount of tungsten concentrates. But disagreement among the owners led to a shutdown, and for the past three years the ground has been idle.

Description of the Property.

Now the property is owned by the Blue Wing Tungsten Mining & Milling Company,

OIL SHALE PLANT GETTING UNDER WAY.

At the Monarch Shale Oil Company plant heating of the big retort has been under way for the better part of the week, but no high degree of heat has been tried. The plant is all ready for starting up as soon as Mr. Ginot, inventor of the process used, can be present.

The slow, preliminary heating is necessary, however, to drive out all the moisture from the brickwork. The retort is set in fire brick much like a boiler, but the full-length combustion chamber under the retort is largely filled with fire brick built up in a series of baffles so that flames from the burning fuel will not touch the retort. As fuel oil was not available, kerosene is being used for heating, but when in regular operation the fixed gas generated by the process will be burned for fuel.

Mining and crushing operations have been started high up on the mountain, the crushed shale being delivered to bins at the retort through a four-inch pipe-line 1,732 feet long, laid on the surface down the mountain. It is reported to be working satisfactorily, delivering the crushed shale at the rate of two tons an hour.—De Beque New Era.

EUREKA-UNCLE SAM SHOWS NEW ORE VALUES.

By A. J. MOORE.

Eureka, Nevada, April 9.—During the boom days of Eureka one of the sensational producers was the Old Hamberg. Whenever the camp lacked a sensation it could depend upon it that about that time the Hamberg would cut a new rich ore-body and start things all over again. This mine is credited with having produced over \$3,000,000, and was in a very rich ore body when it reached the endline of the property. Efforts were made to purchase the adjoining property, now the Eureka-Uncle Sam, but the owners would not sell at that time. Later Frank T. Torpey and San Francisco associates secured it and at once began driving a tunnel to reach the ore body that the Hamberg was so reluctant to quit.

The main tunnel is now in 550 feet and the full face shows values of \$49.80. About 450 feet more have to be made before the endline is reached. Long before the endline is reached it is expected that the extension of the Hamberg ore will be found. The ore now in is not supposed to be that from the Hamberg but a new ore body. However, should it prove to be the Hamberg ore, then Eureka-Uncle Sam will develop into one whale of a mine.

During the progress of the tunnel two old ore channels have been cut. One of these is about ten feet wide and a streak shows assays of \$30.60. Developments have proven so important that while at the camp this week Mr. Torpey ordered work to progress day and night. Extra miners have been secured and Superintendent D. States will crowd the work as fast as possible.

VANADIUM CORPORATION FAILS.

Federal Judge Robert E. Lewis has appointed John L. Stivers, a Montrose attorney, receiver for the Colorado Vanadium Corporation, which formerly did business at Sawpit and which quit business last fall after losing about \$400,000 of the company's money. The outfit was managed by a lot of would-be experts who figured they knew it all, and like others of the same kind, the company soon found to their loss that about the only thing the management knew was to get rid of the money. The company was capitalized at \$3,000,000 and it is claimed the assets are now about two and a half million. There are about fifty suits for money standing against the company at this time by merchants of Telluride and by miners and other laborers for their wages.—San Miguel Examiner.

Many a man wears his heart out with regrets over things he wants to do and cannot.

Personal Mention

C. W. Corfield, Utah Copper Company electrical engineer, left for New York on the first to be gone several weeks.

William T. MacDonald has become mill superintendent for the Moctezuma Copper Company at Nacozari, Sonora, Mexico.

Sir Ernest Oppenheimer, mining man of South Africa, is making a tour of the mines of the southwest. He is accompanied by Lady Oppenheimer.

Frank E. Grant, superintendent of steam-shovel operations for the Nevada Consolidated Copper Company at Ruth, was a Salt Lake visitor last week.

H. A. Titcomb, widely known mining engineer of New York, passed through Salt Lake on the first on his way into the Pioche country, where he was called on professional business.

Edward Thornton, recently with the American Smelting & Refining Company at Tucson, has been appointed general manager for the Arizona United Mining Company at Johnson, Arizona.

Manager S. F. Hunt left for the Jackson mine in Elko county, Nevada, last week. In anticipation of the early return to "normalcy" in metal markets work is to be resumed at the property at once.

O. H. Johnson, representing the Marcey mill department of the Mine & Smelter Supply Company, with headquarters in Denver, was a business visitor to Salt Lake during the first few days of the month.

Henry M. Adkinson, the well known mining engineer and manager of the R. H. Officer & Co., assayers and chemists, has moved his offices from the seventh to the sixteenth floor of the Walker Bank building.

George O. Bradley, of the engineering firm of Bradley, Bruff & Labarthe, and for a number of years consulting mechanical engineer for the Utah Copper and other Jackling enterprises, was a business visitor to Salt Lake early in the month.

R. C. Gemmell, general manager of the Utah Copper Company and assistant managing director of other Jackling porphyries, left on the 1st for New York City on a business trip of several weeks' duration. Accompanying Mr. Gemmell are Mrs. Gemmell and J. E. Cawley, private secretary.

E. Skougor, consulting industrial engineer, 150 Nassau street, New York, has departed on a professional trip to England, France, Belgium, Holland, Germany, and the Scandinavian countries. He also expects, if possible, to go to Russia. He will return in the course of two or three months.

J. O. Elton, of Great Falls, Montana, an alumnus of the University of Idaho, was made the recipient of an honorary degree from his alma mater during the recent in-

auguration of Dr. A. H. Upham as president of the university. The degree was conferred in recognition of Mr. Elton's work in the hydro-metallurgy of zinc.

Dr. Charles H. Gowan, for the past several years chief surgeon of the Ray Consolidated Copper Company, with headquarters at Ray, has resigned that position and left for the east. Dr. O. E. Utzinger, of Hayden, becomes the new chief surgeon for the Ray Con., and Dr. Fitz R. Winslow will assume the position vacated by Dr. Utzinger.

Fred Hellman, chief consulting engineering to E. J. Raddatz, president and general manager of an extended tour of the larger mines of Arizona, including New Cordelia, Inspiration, Miami, and several properties in the Warren district. He was at one time manager of the Chile property and spent a number of years in the South African mines.

C. L. Colburn, who has served as assistant chief mining engineer of the Bureau of Mines for the last two years, has been given the duty of visiting the various coal and metal mines of the country for the purpose of acquainting the operating companies with the scope of the technical safety service available to them through this co-operation.

R. H. Glover, representing the Pacific Coast branch of the Simonds Manufacturing Company, the great saw concern, has been spending several days in and around Salt Lake on one of his extended intermountain trips before returning to San Francisco. He believes industrial bottom has been reached and predicts a gradual but certain return to "normalcy" during the present year.

Stewart Campbell, state mine inspector of Idaho, was a Salt Lake visitor for a day or two around the first of the month. From here he went to Portland to attend the mining congress sessions last week. Mr. Campbell has comprehensive plans for making the state mining inspectorship a valuable aid in furthering the best interests of the metal mining industry in Idaho from several different angles.

Letson Balliet, mining engineer, who gave up his practice in 1917 to accept a position as efficiency engineer at one of the largest shipbuilding plants in the west, has resigned with the shipbuilding company, to again build up his practice as a mining engineer, with offices at 1508 Hobart building, San Francisco. Mr. Balliet has been in the past and will be in the future a frequent contributor to The Review, and needs no introduction to our readers.

A. J. May has been appointed mine superintendent at the Tintic Standard, according to E. J. Raddatz, president and general manager, to succeed John Westerdahl, who was shot and killed in the holdup at Dividend a short time ago. For the past two years Mr. May, who is a graduate engineer of wide experience, has been engineer and assistant engineer at the Gemini mine at

Eureka. Previous to this Mr. May was employed in various capacities by several of the Arizona copper mining companies.

N. H. Brown, the well known Denver mining engineer, representing the Florida Mountain Mining Company, of Silver City, Idaho, passed through Salt Lake early in the month on his way to camp. He stated that the company had decided to suspend operations on its own account temporarily and that he was going to the property with a purpose of leasing blocks of ground in the mine to responsible miners of the camp. He expects to make it profitable for quite a number of miners to operate in the mine.

Petroleum Notes

Gas has been struck and a strong showing of oil is reported in Cassia county, Idaho. At Goose creek one company is down over 2,300 feet. This is a test well and the company proposes to go to the bottom unless prevented by a flow of oil.

Frank A. Wadleigh, passenger traffic manager of the Denver and Rio Grande at Denver, Colo., has had a million maps of the Utah oil fields printed for free distribution the country over. Twenty-five thousand are being sent to Utah with the Price Chamber of Commerce receiving its quota.

Christian Vrang, geologist from Salt Lake, has arrived in Ely and was accompanied to the Illipah fields by T. H. Craig and C. C. Caperton, where he will spend several days examining the geological structure, with a view to making a report on same to the Consolidated Oil Company.—Ely Record.

E. H. Street of American Fork, deputy state bank commissioner, in charge of the Moab State bank, was recently in Salt Lake from the Grand county seat, and reported great excitement there over the discovery of gas in the well being sunk by the Big Six Oil Company, just across the river from the town of Moab.

Shooting of a dry well in the shallow field section of the Osage, Wyoming, oil district resulted in starting an oil flow that may lead other operators in that field to adopt similar means of securing production. The Nye Petroleum Company made the experiment and claims to have obtained commercial production.

The giant gasser of the Midwest Refining Company in the Little Buffalo basin, fifty miles northwest of Thermopolis, Wyo., is to be put down to a lower level for oil production. The company plans to "mud off" the gas sands and drill to the oil production expected below the 2,025-foot level where the gasser started to give trouble last October 3.

Three large trucks to be used in freighting drilling equipment and supplies into the oil fields have arrived at Green River from

Casper, Wyoming. A carload of tents and camp supplies to be used by the Midland hotel for accommodation of guests has reached there. The hotel has been crowded to capacity recently so that immediate temporary accommodations had to be provided.

The opening up of two new wells by the Raven Oil and Refining Company at the Rangely oil fields makes that concern the largest producer of crude oil of any company operating in Utah. While the wells are not in Utah, they are just over the line in Colorado. The Raven Oil and Refining Company is financed principally by Utah capital and is a Utah corporation with headquarters in Vernal.

The No. 28 Star rig of the Utah Oil Development Company started for the lower San Rafael swell on the 1st, in charge of Charles Magnuson, vice president, and Jack Lovell, driller. It is estimated that the rig, which will drill to a depth of 4,000 feet, should be spudded in in fifteen or twenty days. With 100 feet of ten-inch casing and a complete drilling equipment, Mr. Lovell is confident that the sands which lie at a depth of 2,000 feet should be reached in good time.

News received from Lewiston, Idaho, states that the first oil rig has arrived and will be set up and drilling will start immediately. Several geologists have investigated this area and oil outcroppings have been found in sufficient quantity to merit boring for oil. If oil is struck at Lewiston at the junction of the Snake and Clearwater rivers this will be the first oil to be found in any quantity in Idaho. One of the geologists stated that a great stratum of oil would be struck 2,000 feet below the surface.

It is announced by Ben S. Read, president of the Mountain States Telephone & Telegraph Company, in Salt Lake on a regular inspection trip that the telephone company is watching the progress of the effort to find oil in paying quantities in Utah, and he declared that his company within a few hours after it becomes certain that the fields have been proved up and show signs of permanency will have men on the way into the territory with poles, wires and apparatus. Close to \$750,000 will be spent in Utah this year by the Mountain States company, Mr. Read said.

A. J. Davis, who put down the first oil well in eastern Utah in the San Rafael Swell country some nineteen years ago, accompanied the big Zion crowd from Price to Huntington last Saturday. For several years he has made his headquarters in Buenos Ayres, S. A., but comes to Utah about twice a year. He formerly was with the old Knutsford hotel at Salt Lake City and at one time was president of the city council at the state capital under the American party's control. This first well had a depth of 1,350 feet when the tools were drawn. Davis has never lost faith in Emery county as a great

oil field. He will be back here later.—Price Sun.

The second standard rig to operate in the Circle Cliffs field will be on its way to the district by way of Green River within the next few days, according to an announcement made by the Circle Cliff Company. The first rig in the field is that now being operated by the Ohio Oil Company. The Circle Cliffs concern, backed by Utah, Wyoming and Iowa men, was organized recently to develop the claim of M. J. Gothberg, who was granted a prospecting permit near the Ohio ground in Circle Cliffs about four months ago.

In Nearby States

ARIZONA.

Pockets of asbestos have been found at Globe on the Superior and Boston Mining Company's property.

A. G. Cushman and wife were Kingman visitors recently, Mr. Cushman looking over the mining fields of the county. Mr. Cushman is heavily interested in the timber industry and is also greatly interested in mining, having been one of the big fellows in the early days of the Goldfield and Tonopah excitements.

After long idleness the Eva Consolidated Mining & Leasing Company's properties in Maricopa county are to be reopened. The Magwood Copper Mines Company has taken over the property and will develop it under the direction of Kirby Thomas, of New York. The company is being financed through the Standard Securities Company, of New York.

The United Eastern and Tom Reed have taken over the stock of the Fred Elkins grocery store and the meat market of Ernest Krohn in the Oatman camp. It is understood the new business will be incorporated and known as the Oatman Stores Company. The mining companies have been planning to open a store for some time, and will sell provisions and goods to the men at actual cost, plus overhead expense.

The drilling outfit has arrived, is set up, and at work on the Oatman United. They are driving at an angle to gain about 300 feet more depth below the 600. This work can be done for one-fourth what it costs to drive the usual cross-cut, and be done in less than one-fourth of the time. If the drills tap an ore shoot, the rest is easy; the miners will know what to do, and where to go—no guess work or driving blind.

The United Eastern struck a "gusher" driving the diamond drill from the 1400. Hot water came sizzling through one of the holes that was being bored, forcing the drillers to quit. The drills were pulled and the hole was plugged, but the water continued

to boil through the adjacent cracks, proving that the drills had tapped something with force and "steam" behind it. Mining experts claim that this is the best indication of good values at greater depth.

COLORADO.

A carload of gold ore recently shipped by M. J. Rankin, lessee to the Jerry Johnson mine on Ironclad hill, Coy Creek, was settled for at the rate of \$120 per ton.

The corporation commission may require corporations organized in this state to obtain a permit for the sale of stock, even though the corporation proposes to confine the sale of the certificates of stock exclusively in foreign states, according to an opinion rendered recently by Attorney General Galbraith. The issuing of any temporary stock of a corporation, whether to one person or to the public, comes within the purview of the blue sky law, requiring first, the obtaining of a permit, he says in his opinion.

The Standard Chemical Company, according to Denver advices from Montrose, has resumed operations at its big carnotite plant in the west end of the county, according to announcement by General Manager John I. Mullen. More than 150 men will be re-employed at the various plants of the company. This company is the largest producer of radium in the world and the cessation of mining operations last fall did not seem very favorable to the carnotite industry, but Mr. Mullen states that the industry is in good condition, and that operations will be even more extensive in the future than in the past.

It is given out by Fred C. Gilbert, manager of the American Smelting and Refining Company, that the Pueblo smelter will likely be closed at an early day, although an effort will be made to keep one furnace going. It is planned to keep the Leadville and Durango plants in operation, and all shipments from this district will be sent to Leadville, causing a longer haul and an additional charge for freight, which is another move of the railroads to get more freight business. The railroads are up against it and are trying all kinds of schemes to break even, except that of eliminating the 75 per cent of watered stock that they want the public to pay interest on.

IDAHO.

Successful operation is reported by the Idaho Leasing Company at its new mill at the Black Bear mine in the Coeur d'Alenes.

About 225 tons of concentrates are being shipped each month by the Mullan Milling Company, which is working a lease on Government gulch, west of Kellogg. The ore is said to carry 75 ounces of silver to the ton and to run 25 per cent lead.

Machinery has been installed at the Bloyer Mining Company's property, which has seven claims on Poor Man's creek in the Pierce mining district, twenty-six miles from Orofino, and operations will start as soon as weather permits, according to recent reports.

Ore has been struck in the Chicago-Boston in a crosscut from the shaft on the 400-foot level, according to reports received from Spokane, Wash. The ore is the same as that found in the drift, not commercial, but lots of it scattered through a fine appearing vein.

The Mullan Milling Company, which for the last year has been operating a lease on Government gulch a few miles west of Kellogg, has shipped over 3,000 tons of concentrates a month. The ore is of high silver value, averaging 75 ounces to the ton with 25 per cent in lead.

Thirteen cars of ore shipped by the leasers of the lower workings of the Western Union Mining Company, in the Coeur d'Alenes, have brought returns of \$33,000. Of this amount the company receives 25 per cent in royalties. The leasers began shipping in November last.

According to reports the Bunker Hill and Sullivan Mining Company of Kellogg, has taken a bond and lease on the Bullion and Mayflower groups of claims at Hailey and started a tunnel to explore virgin ground in these two famous properties. In the early days of Hailey mining activities these properties produced more than \$2,000,000 of high grade galena and at one time several hundred men were employed.

The last survivor of the party that made the early gold discoveries in the Boise basin, which developed that section into one of the great gold-producing sections of the world fifty years ago, is at death's door at North Yakima. He is Mose Splawn, who was with the Grimes party which first prospected Moore's creek and in whose arms Captain Grimes died after being struck by an arrow shot by attacking Indians.

Good looking ore has already been struck in the New Caledonia property between Kellogg and Wardner, but it is not in the main vein, according to reports received at Spokane. Since last fall the new company, which has taken over this property, has been extending the work. The crosscut is now in about 400 feet and it is believed it is close to the ledge. The property lies along the street between the two towns and extends west to the Caledonia line.

The Slavonian group on Milo creek, opposite the Last Chance compressor in Wardner, is making preparations to start extensive development work. It is the intention to continue the work on the lower tunnel, which is now in 850 feet, to encounter the ledge that is showing in the outcroppings. A depth of 375 feet is attained

and it is necessary to go only a short distance to reach the ledge, which should be encountered at a depth of about 500 feet. A good showing of silver and lead ore is reported.

G. Scott Anderson, manager of the Big Creek Mining Company, is operating a mill of seventy-five tons capacity on the property on Big creek east of Wardner. The mill is producing from one to two cars of concentrates a week, said to average 100 ounces in silver to the ton. The ore is gray copper and galena, differing materially in the general run of Coeur d'Alene ores in that the silver and iron predominate, leaving the lead an unconsidered factor. The mill is connected with the mine by a two bucket aerial tramway.

Dr. Charles R. Mowery, president of the Highland-Surprise Consolidated Mining Company, in the Pine Creek district of the Coeur d'Alenes, submitted his annual report to the stockholders at their meeting in Kellogg, April 4. He includes a financial statement for 1920, reviews the work done during the year and suggests that the company put the property in condition to take advantage of the home market for its ores that will be created by the building of a zinc smelter at Kellogg by the Bunker Hill & Sullivan Mining & Concentrating Company.

W. A. Clark of Butte may resume operations on his Sunset property in the Coeur d'Alenes as a result of the visit to the property by the manager of Clark's Montana mining interests. Some time ago the Days of the Coeur d'Alenes secured permission from Clark to run a long tunnel from the bottom of the 1,000-foot shaft on the Sunset property into the West Sunset. It was reported that a good stringer of ore had been struck by the Day workmen in running this drift from the Sunset shaft. It was only eight to ten inches wide, but has continued for a long distance and gradually widened out until it is now more than three feet wide. The ore is said to be a lead-silver product without zinc.

MONTANA.

According to letters received by Livingston residents from Frank Wells of Cooke City, the Mohawk Mining Company has struck a rich vein of silver at the property close to Cooke. The ore is rich in wire silver, the letter declares. Miles City men own the largest interest in the mine.

Senator J. F. Russell of Hilo, Hawaii, and associates have taken a lease and option from T. F. Van Horn of New York and the Two Per Cent Silver property in the Philipshurg district. The mine was a rich producer in the '60s and '70s. F. G. Loomis, manager of the property, reports that in sinking to the present depth of 500 feet he

has taken out some high grade ore. He expects some fine ore when a secondary deposit is reached.

A big strike of gold ore at the Shannon mine in the Marysville district near Helena is reported. The Shannon is one of the main producers of the Barnes-King company. According to the report, the strike was made on the 400-foot level of the mine at the west end. The newly uncovered ore is reported to have a good content of gold and is in a vein about fifteen feet wide. It is one of the biggest gold strikes made in Montana in some years.

NEVADA.

Driving of the tunnel on the Eagle Comstock, two miles southwest of the Florida, is to start soon. Fifteen veins have been exposed on this property. The tunnel is designed to cut the junction of the main ledge with another vein sampling \$12 to \$100 per ton.

An important discovery is reported made in the Jackson claim of the Big Chief Mining Company, in the Gold Circle district, forty miles northeast of Golconda. At the 200-foot level of the main shaft five feet of ore is exposed that pans free gold and considerable of the yellow metal can be seen with the naked eye.

Ore bodies of an astonishing character have been opened on the property of the Boston and Ely Consolidated Mining Company, located just above what is commonly known as the old lime kiln, west of Ely. One hundred and twenty-five tons of ore running 8 per cent copper are now on the dump, while picked samples from a large body developed by a winze will run as high as 89 per cent.

The Gold Ore mine has resumed work in the Gold Roads district. They intend to go deeper and get under the good ore exposed on the upper levels. Judge Werden believes if he can get a certain amount of work done the future of the property is assured and the mine will speak for itself. The property is located only a little distance from the Gold Road mine where they took out millions for several years.

Dan C. Kennedy, formerly deputy sheriff at McGill, who is now a resident of Cherry Creek, was an Ely visitor and states that the old-time camp is showing new signs of prosperity. The Star mine is starting up and putting men to work. J. W. Walker is driving a tunnel on the Mary Ann property and expects to soon strike the lead, and a number of miners are leasing on the Exchequer mine. Prospects for the summer are encouraging.—Ely Record.

James Marriott, of the Osceola district, recently arrived in Ely, and reports that he and his brother, who have been engaged during the entire winter in the development of

their gold properties, are meeting with satisfactory results, and feel that they are in a fair way to demonstrate a permanent producer. Recently they had a test run made on a small batch of ore which convinced them that they had a property of real merit. The miners of the Osceola district are fortunate in having a number of mills convenient to their properties at which their ores can be treated at a reasonable price.

Foster S. Naeting, a prominent mining man, representing the Cornell company of New York, arrived in Winnemucca a few days ago and left on the next train to examine the Sheba Dyke property, located about eight miles south of Mill City, in the Humboldt range.

The Dickson lease on the Southwest Comstock is preparing to send the 200-foot shaft 100 feet deeper to reach the junction of the four veins exposed in the mine. The property was the first to attract attention to the North Carson section, and is practically at the shipping stage. Work has been resumed by the Nevada Protective Company, and at the Comstock Superior sinking is proceeding on ore of shipping grade. The management plans early installation of a compressor and power drills, and extension of the 420-foot tunnel to the 1,000-foot point to open a series of veins at depths ranging from 350 to 800 feet.

AMAZON-DIXIE IN SHAPE TO OPERATE EXTENSIVELY.

The president of the Amazon Dixie Mining Company, operating in the Coeur d'Alenes, Idaho, has issued a report showing the completion of electrification of the mine and equipment and that the long crosscut tunnel has progressed to a point where any shot may open the ore body.

"Completion of the extension development ordered in November, 1918, can now be reported," says the statement from the officers. "The work has been a most arduous undertaking, particularly as underground development has been kept going continuously.

"Installations completed include a nine-mile high power voltage electric power line through the Lolo forest to our property; one 18-ton and one five-ton transformer near Taft, cutting in on the power line of the Montana Power Company, which furnishes the Chicago, Milwaukee railroad; five transformers, one 100-horsepower electric hoist with motor, one 150-horsepower electric pump and several smaller pumps; one 75-horsepower electric motor for our two compressors; electrification of all other machinery; placing 3,000 feet of electric cable transmitting power to underground works, and installation of 15,000 feet of electric wiring."

Alaska's shore line is greater than the circumference of the earth.

Method Used to Control A 6,000,000-Foot Gas Well

By F. D. TOUGH*

An unusual job in controlling a gas well was executed on No. 1 well, Inland Oil and Refining Company, situated on the Alkali Butte structure, Fremont county, Wyoming. The work was done by the company in co-operation with the U. S. Bureau of Mines, and resulted in a fuel saving of \$6,000 in one season and of a repair job estimated at \$15,000, or a total of \$21,000.

The well had an open flow of 6,000,000 cubic feet of gas per day with a rock pressure of 560 pounds per square inch. A string of 6¼-inch casing with a toothed shoe was set on the cap rock above the gas sand at 2,481 feet. When the well was shut in, the gas worked out around both the 6¼-inch and 8¼-inch strings, breaking through the ground surface at several points under the derrick.

Casing troubles encountered while drilling made it unsafe to attempt moving the 6¼-inch string. Moreover, it was important from the standpoint of good management to make the gas from this well immediately available for fuel in other operations and, in addition, to save the gas from wasting. An ordinary mudding and cementing job would have necessitated shutting down this well for probably two months out of a very short operating season.

For these reasons it was determined to mud the well, if possible, between the 6 and 8-inch strings by pumping mud fluid through the connection from the gas clamps. The gas clamps used were of ordinary construction with a side outlet, making them equivalent to a Braden-head.

When the mud fluid was pumped through the gas clamp into the space between the two strings, it began to appear inside the 6¼-inch string. It apparently entered the well either around the toothed shoe or through a "line-sawed" leak in the string and was blown out of the well as fast as it was pumped in.

In order to stop the leaks, about a half a gunny sack of finely chopped bull rope was fed with the mud between the casings as before. The hemp gathered around the valves of the mud pump to some extent, and it also stuck in the casing-head fittings a few times. An obstruction in the casing-head would be removed by permitting the well to "blow back" for a few seconds, and one in the pump valves, by removing the valves when necessary.

In two days' time sufficient hemp and mud had been pumped into these strings to kill external and internal pressure. The well was shut in and allowed to stand over night. The next day, by opening and clos-

ing the master gate at intervals, and allowing the well to build up what pressure it would, it was found possible to blow the mud from the inside of the 6¼-inch casing. The chopped rope had presumably gathered around the shoe and also filled any "line-sawed" places in the 6¼-inch casing, and was holding in place the mud fluid between the casings.

The gas was thus made available for fuel, and the waste of gas by dissipation into the overlying formations and into the atmosphere was also prevented. It is interesting to note that after several weeks, during which period the mud had been afforded time to settle, a small amount of gas was observed leaking at the surface. About the same time it became possible to relieve the pressure by turning the well into the pipe line which had been laid to supply the camp and three drilling wells. A pop valve placed in this line was regulated by experiment to pop off at a pressure slightly less than the pressure at which gas would begin to leak at the surface around the well. Because of the demand for gas the pop valve was seldom called upon to relieve the pressure. The wastage of gas became so small that, considering the need for fuel, it was deemed an act of true conservation to leave the well in that condition.

Conservative estimates indicate that an equivalent amount of coal for the three drilling wells and lease houses mentioned, would have cost about \$6,000 for that season, not to mention the uncertainty of the coal supply, due to labor and hauling conditions. It is further estimated that this job saved a \$15,000 repair job on the well, besides making available a full crew for drilling another test well.

While this method is not recommended for use in a proven field, it was very satisfactory in the case described, where the economic conditions seemed to justify its use.

A short time ago the miners employed in the Spruce-Monarch mine at Sprucemont, following the development that has proceeded constantly throughout the past winter, made one of the most important strikes in the history of the property. R. O. Dobbs of Salt Lake City, consulting engineer for the company, states that a nine-foot face of the ore body gave results upon sampling, of 27 per cent lead and 40 ounces of silver per ton. The prospective tonnage to be developed is great, both above the tunnel level, four or five hundred feet to the surface, and at depth upon the dip of the deposit. The ore is a gray and brown carbonate of lead with some galena.

*Supervisor, Oil and Gas Operation.

Oil Leasing Supervision Goes to Bureau of Mines

Supervision of the Leasing Act of February 25, 1920, known as "an act to promote the mining of coal, phosphate, oil, oil shale, gas and sodium on the public domain," was placed by the Secretary of the Interior under the immediate direction of the Bureau of Mines. The Bureau, up to the present time, has not been able to care adequately for the work, which has expanded until the present oil production from government lands in California and Wyoming will total 14,000,000 barrels annually. Prospecting permits for drilling also have been granted in eleven other states and Alaska. Seeing the need of more adequate supervision of this production, congress, in the closing days of its last session allotted to the Bureau of Mines \$60,000 to properly organize and carry on this work until July 1, 1921.

Oil and Gas Production Regulations.

Operating regulations to govern the production of oil and gas have been issued. According to these regulations, it shall be the duty of the oil and gas supervisor and his deputies to visit leased lands where operations for the discovery and production of oil and gas are conducted and to inspect such operations with a view of preventing waste of oil and gas, damage to formations or deposits containing oil, gas, or water, or to coal measures or other mineral deposits, injury to life or property, or economic waste; and to issue instructions which will prevent such waste.

Lessees under these regulations shall provide tanks suitable for containing and accurately measuring the crude oil produced from the wells and shall furnish the supervisor with accurate copies of all tank tables. The quality of oil produced is also determined by the supervisor. The royalties payable under these leases depends both on the amount and quality of the oil produced, ranging from 12½ to 25 per cent for all oil produced of 30 deg. Baume or over and from 12½ to 20 per cent for that of less than 30 deg. Baume.

F. B. Tough, petroleum technologist of the Bureau of Mines, has been made Supervisor of Oil and Gas Operations, with headquarters in the customhouse building at Denver, Colorado, and will report direct to the chief petroleum technologist in Washington. District engineers and deputy supervisors, together with oil gaugers and clerks, have been placed at Casper, Wyoming; Winnett, Montana; Bakersfield, California; and Shreveport, Louisiana, reporting to the supervisor at Denver.

Oil Shale and Other Leases.

Leases dealing with coal, phosphate, oil shale, and sodium as they involve mining

operations, both underground and surface, are under the immediate technical charge of George S. Rice, chief mining engineer of the bureau. At the present time, the principal mining operations are in coal, although leases have been applied for covering the other mentioned minerals. This part of the work will be handled in the field for the present by a district mining supervisor, with offices in the Customhouse building at Denver.

Operating and safety rules and regulations for coal mining operations under the terms of the act have been prepared and approved by the secretary of the interior and are now in process of publication. Similar regulations covering the special mining conditions of other minerals are now in course of preparation.

Permits may be issued to include not more than 2,560 acres of land wherein the deposits belong to the United States and are not within any known geological structure of a producing oil or gas field or a similar amount of land containing deposits of coal, sodium, or phosphates, and not to exceed 5,120 acres of land containing oil shale deposits. The boundaries of the geological structures involved in the leases are determined by the Geological Survey and the control for permits and leases was entrusted by the secretary of the interior to the general land office.

METEOR MINE OF ARIZONA IS BEING EXPLORED

Believing that the world's richest nickel and platinum mine lies beneath the Meteor mountain, a few miles southeast of Flagstaff and southwest of Winslow, the United States Smelting and Refining Company started drilling for the meteor which, scientists say, lies buried there, says the Arizona Mining Journal.

Several years ago a syndicate financed by Philadelphia capitalists drilled a hole in search of the meteor. About a thousand feet below the floor of the depression in the center of the mountain, the hole struck a very fine quicksand which caused so much trouble drilling was abandoned. The United States company hopes to ease off the quicksand by employing more modern drilling methods. It is announced that the corporation will continue drilling till the meteor is located.

The United States company's hole is now down about 300 feet, in a shattered limestone formation that is extremely difficult drilling. Losses of tools are frequent.

From the formation of the crater, it is deducted that the meteor hit the ground at

an angle, perhaps of 30 degrees. The fact that one side of the crater is higher than the other seems to prove this. The theory of the engineers is that it penetrated to the red stone, then perhaps skidded for a short distance before it came to rest.

In its drop to the earth, friction with the atmosphere of the earth heated the outside of the meteor to such an extent that it shed particles from its sides. These were particles compared to the size of the meteor, though some of them were pretty large to be called particles, at least one of them weighing 1,800 pounds.

William Volz, who used to run the trading post at Canyon Diablo, found that these fragments of the meteor were valuable, though he did not know how valuable. He gathered and sold many tons of them at 75 cents a pound. Every fragment so far contains, with little or no variation, two per cent platinum and six per cent nickel. Platinum is worth \$120 an ounce. So a pound of the meteor is worth about \$36 for its platinum alone, to say nothing of its nickel content.

The United States Smelting Company has gathered up a lot of the fragments—a good many tons in all. Its claims cover 320 acres and there was a lot of the stuff lying around on the surface partly imbedded that had not been carried away by Volz and others.

When the drilling is done, a shaft will be sunk and drifts run until the meteor is found. It is estimated that it weighs several million tons; so it can easily be understood why, once it is located, it may prove to be the largest and most valuable mine in the world. There may be a big town at Meteor mountain some day, perhaps soon.

The hole made by the meteor is more than 500 feet deep. It probably was at least 200 feet deeper at first, but it has gradually been filled in. It is believed that the meteor itself is about 500 yards in diameter. As it must be extremely dense and heavy, it isn't a thing a man can put in his coat pocket and walk away with it.

RECENT MINING DECISIONS.

Oil Lessee's Possession of Surface.—By virtue of the terms of the usual and ordinary oil and gas mining lease, the lessee is entitled to the possession of such portions of the surface of the land covered by the lease as may be reasonably necessary for the development and exploration of the leased premises under the terms of the lease.—*Sanders v. Davis*, Supreme Court of Oklahoma, 192 Pacific 694.

Taxation.—Where mining claims were assessed for taxes as patented claims and sold to the county for delinquent taxes, a stranger to the title, who purchased them from the county, was not entitled to a refund under Comp. Laws 1917, § 6043, providing for a refund of taxes erroneously or illegally collected, though the claims were unpatented, and though unpatented claims are not taxable, as the payments were voluntary, and the rule of caveat emptor applied. Assuming that proceedings leading up to a tax sale to the county were legal and regular, the county became to all intent and purposes the legal owner of the property upon the passing of the auditor's tax deed therefor. *Wilson v. Salt Lake County Corporation*, Supreme Court of Utah, 104 Pacific 125.

May Dredge for Gold In Sands of Grand River

According to the daily press a combination of operators at Garfield, Utah, are nosing into other things than the milling and smelting of ores. Plans, it is said, are being considered by the Utah Placer Mining Company with regard to the development of its property of 800 acres lying on the Grand river, just below the mouth of the Dolores river in Grand county, Utah. The nearest railroad point is Cisco, on the Denver and Rio Grande railroad. The Fish Ford group of claims, consisting of 640 acres, lies about five miles up the river from Cisco. Upon the Fish Ford claims the gravel will average per yard about 60 cents in gold and 91 cents in platinum, according to Secretary-Treasurer H. J. Butcher. Officials of the company believe that the gravel on the claim can be most successfully handled by dredging.

One Deposit Goes \$1 Per Yard.

Fifteen miles down the river from the Fish Ford claims are situated the Beaught and the Helen claims. The gravel of the Beaught claim carries about \$1 in gold and 46 cents in platinum per yard. Probably the work upon the Beaught and the Helen claims can be done most economically by sluicing, according to Mr. Butcher. The water supply is adequate for all mining purposes. All other conditions are said to be favorable for development.

Well planned development work of the company was interrupted in 1918 by conditions arising from the war. All of the effects resulting from these conditions have been overcome so that, officials of the company believe, work can be begun with the opening of the season.

Recently some interesting tests were made upon samples from the company's Beaught and Helen claims to determine whether Wilfley tables could be used effectively in recovering the values from the gravel. Superintendent T. A. Janney of the Utah Copper Company gives the following report upon the tests:

Concentration Tests Are Made.

"From the Helen sample a recovery of 50 cents in gold or approximately 42.73 per cent was made. Results of the test of the Beaught sample were more satisfactory, from the fact that a recovery of 84 per cent was made.

"By these tests it was found that the gold from the Beaught sample concentrates very readily and good recovery of same can be made from table concentration, while in the case of the Helen sample gold did not concentrate as satisfactorily as in the case of the Beaught sample.

"From the test, it is apparent that the

gold is associated with iron. Although a clean concentrate was made, a large percentage of the iron was not concentrated. This assumption is apparently correct, as in the Helen sample, 42.73 per cent of gold was recovered and only 16 per cent of iron, while in the case of the Beaught sample 84 per cent of gold was recovered and 33.82 per cent of the iron, showing in the latter case twice as much gold was recovered as in the former, and about twice as much iron was recovered.

"We took a small portion of the concentrates, made from the Helen test, and found that about 68 per cent of the concentrates was composed of magnetic iron, and 32 per cent nonmagnetic. It would be interesting to determine whether or not the gold value was in the magnetic iron or nonmagnetic iron, but, inasmuch as the sample was not large enough, we could not determine this."

Officers and directors of the company are as follows: Theodore Peterson, president; Harry Grass, vice president; H. J. Butcher, secretary-treasurer; Edward Helmerich, George C. Phillips, Harry H. Murphy and F. T. Toms.

MAGNESITE INDUSTRY IN 1920.

The production of magnesite in the United States in 1920 increased 94 per cent in quantity over that of 1919. The entire output was made by two states, California and Washington. California mined 63 per cent more magnesite in 1920 than in 1919 and more than eight times as much as it mined seven years ago. Washington increased its production 109 per cent over that of the preceding year, making by far the largest output it has yet made. According to the United States geological survey, department of the interior, the total production of magnesite in the United States in 1920 was 303,767 short tons, which was valued at approximately \$2,748,150. The following table shows the production by states:

Crude Magnesite Production for Eight Years.

Year	—California—		—Washington—	
	Quantity Short Tons	Value	Quantity Short Tons	Value
1913 ...	9,362	\$ 77,056	.....	.....
1914 ...	11,293	124,223	.....	.....
1915 ...	30,499	274,491	.....	.....
1916 ...	154,259	1,388,331	715	\$ 5,362
1917 ...	211,663	2,116,630	105,175	783,188
1918 ...	81,077	761,811	147,528	1,050,790
1919 ...	50,020	504,973	106,206	743,442
1920 ...	81,782	1,083,262	221,985	1,664,888

Most of the output of California was calcined and used as plastic material, only a small part being natural ferromagnesite used as a refractory lining of steel furnaces on the Pacific coast. On the other hand, practically all the magnesite mined in Washington was dead-burned into synthetic ferromagnesite and used as a re-

fractory lining of furnaces and smelters.

The largest producers in California were the Tulare Mining Company and the Sierra Magnesite Company, at Porterville; the White Rock mine, operated by Frank R. Sweasy, in Napa county, and the property of the Western Materials Development Company on Red Mountain, operated by C. S. Maltby.

The Northwest Magnesite Company, of Chewelah, Washington, was the largest producer in the United States. It shipped in 1920 more than 90,000 tons of dead-burned ferromagnesite, most of which was sent to steel companies and manufacturers of refractory products east of the Mississippi. The American Mineral Production Company, of Valley, Washington, sold its output crude to the Northwest Magnesite Company, whose quarries are near by. The Western Materials Company operated the Double Eagle magnesite mine, near Valley, and shipped the calcined product to the American Refractories Company.

At the end of December, 1920, all the operations in Washington were stopped, principally, it is believed, on account of a lack of orders from the steel companies, many of which were idle or were not working full time. Some of the California producers were considerably discouraged at the end of the year on account of the high cost of labor and supplies, the high freight rates, and the competition of foreign material.

Magnesite Imported Into the U. S., 1920.

The imports of magnesite in 1920, reported by the Bureau of Foreign and Domestic Commerce as calcined, not purified, amounted to 43,154 long tons, valued at \$780,078. These imports came from the following countries:

	Quantity (Long Tons)	Value
Austria .....	.....	\$ 4
Germany	713	28,566
Italy	21,185	241,220
Czecho-Slovakia	3,829	126,827
Greece	4,000	38,418
Turkey in Europe	3,528	70,540
Netherlands	819	54,991
England	28	3,511
Scotland	190	13,720
Canada	6,028	184,060
Mexico	500	6,300
Venezuela	2,300	11,500
Australia	34	417
Straits Settlements .....	.....	4
Totals	43,154	\$780,078

The magnesite imported from Italy was mined in Austria, and that from Czecho-Slovakia was obtained from the former Hungarian deposits. That imported from Mexico came from Santa Margarite Island and was calcined near San Digo, California. A shipment from Greece received in November was the first one sent from that country since 1916. The arrival of 2,300 tons from Venezuela in September, 1920, was a notable event, as the recorded imports of magnesite from that country are meager.

Although the quantity of magnesite imported in 1920 was nearly three times as great as in 1919, it was only about one-seventh of the quantity commonly imported before the war.

RECORD PRODUCTION OF BORAX IN 1920.

The quantity of borax produced and sold in the United States in 1920 was 35,280 short tons, valued at \$5,674,000, according to R. C. Wells, of the United States geological survey, department of the interior. This is a record production and value, exceeding even those of 1919—28,518 tons and \$4,351,891—which were higher than those of any previous year.

For many years borax has been manufactured in the United States from the mineral colemanite, a calcium borate, which is mined in California, but for the last two years some borax has also been obtained from the water of Searles lake, California, as it is one of the salts that the brine yields by a certain method of treatment. This method of treatment marks a new departure in the borax industry and recalls the old days in the 60's when borax was made by recrystallizing the crude salt found in the mud of Borax lake.

The total quantity of crude borates produced in the United States in 1920 amounted to 120,320 tons, valued at \$2,173,000. This is a record in quantity though not in value, on account of the lower grade of the ores.

Borax, called in chemistry sodium tetraborate, is used in large quantities in making the enameled coating for cast-iron and steel ware used in plumbing fixtures, chemical equipment, and kitchen utensils. It is also a constituent of borosilicate glasses, such as are employed in making lamp chimneys, baking dishes, and laboratory glassware. Considerable borax is also used in the laundry and kitchen, in making soap and starch, in paper sizing, and in tanning and welding.

In the United States a considerable quantity of boric acid is made from borax as well as from colemanite. Boric acid is an antiseptic and is also used in cosmetics. It is also employed to preserve meats under conditions permitted by the food and drugs act.

Figures showing the exports of borax and boric acid are not available, and the imports are relatively insignificant.

The price of borax in 1920 as quoted in the New York market, for crystals in bags, in car lots, averaged 9½ cents a pound. The price in 1919 was about 8½ cents a pound.

Borax was produced in the United States in 1920 by the American Trona Corporation, 233 Broadway, New York City; the Pacific Coast Borax Company, 100 William street, New York City; Charles Pfizer & Company, 81 Maiden Lane, New York City; Thorkillsen, Mather & Co., 111 West Monroe street, Chicago, Ill.

The West End Chemical Company, at Searles lake, expects to begin marketing borax in the near future.

SECURES FULLER'S EARTH DEPOSITS.

On his return from the coast a few days ago, J. B. Jenson, mining engineer and oil shale specialist, had the following to say concerning the southern Nevada region, where he secured options on a Fuller's earth proposition:

"There is a large amount of interest being displayed throughout the section about Las Vegas, and everybody now is prospecting for borax and gypsum. There have been a number of very extensive deals, involving options only, however, for gypsum property.

"In the Goodsprings district, however, everything is dead. The mines are all closed down, even the Yellow Pine, which has a record of continuous operation from 1907 up till practically a few months ago. While in the south I secured options on a splendid deposit of fuller's earth which our company will undoubtedly take over for the treatment of the shale oils for those companies which will use the Jenson education process.

"We have discovered in this particular grade of fuller's earth those qualities that are not usually found, and we find that we can accomplish in one operation what has required several operations by the ordinary fuller's earth to accomplish. The deposit is big enough to serve all of our companies, and it will probably be mined and shipped to the various plants direct from the shipping point in southern California.

"It should be a big step toward the refining of shale oils, inasmuch as we are saving a very large expense, and we are also making a finer product than we could with the old style methods employed in the various refineries. The deposit is big enough to serve ten or fifteen large companies, as it is practically unlimited in its extent. As far as I know, there is only one other similar deposit, and that was acquired a few months ago near Death Valley by the Standard Oil Company. I feel, therefore, that we have been very fortunate in obtaining this on terms which we are enabled to meet."

POTASH FROM NEBRASKA LAKES.

Until 1915 the United States produced no potash salts from native material except wood ashes, but in that year potash was produced from kelp, dusts from cement kilns, and alunite, and from the alkali lakes of western Nebraska. The possibility of developing the reserves of raw material from the first three of these sources has been studied and reported on by the United States Bureau of Soils, of the Department of Agriculture, and the United States Geological Survey, of the Department of the Interior, but no government report has heretofore been issued on the potash resources of Nebraska. In 1918 W. B. Hicks, of the Geo-

logical Survey, spent three months in the alkali lake region of Nebraska, visiting the plants and the productive lakes; collecting samples of brine, water, sand, and mud for analysis; and making a general study of the region. The information he obtained has been studied and careful estimates have been made of the quantity of potash salts in these lakes. These estimate and notes concerning the probable source of the potash salts are contained in Bulletin 715-I, which may be had upon application to the Director of the United States Geological Survey at Washington, D. C.

QUICKSILVER IN 1920.

Preliminary figures showing the production of quicksilver in the United States in 1920, compiled by F. L. Ransome, of the United States Geological Survey, Department of the Interior, give a total of 13,070 flasks. Of this output 9,366 flasks is credited to California, 3,601 flasks to Texas, 79 flasks to Nevada, and 24 flasks to Oregon. So far as is known neither Idaho nor Arizona produced any quicksilver.

In California ten mines were reported as productive; in Texas two; and in Nevada and Oregon one each. In California the New Idria, Cloverdale, New Guadalupe, Oceanic, Carson and Oat Hill mines were closed during the later part of the year, most of them with the expectation that work will be resumed when the conditions for mining and marketing quicksilver have improved. The largest producer, the New Idria, lost its reduction plant and a considerable quantity of quicksilver by fire on June 20. Operations were resumed at about half capacity in September, but ceased entirely in November. In Texas the Chisos mine has been continuously productive, but the Big Bend was closed on the first of November. In Oregon the War Eagle Mining Company reports the completion of a 25-ton Scott furnace, which will not be placed in commission, however, under existing conditions.

The year has been a discouraging one to quicksilver mine operators, who have had to face a decline in prices consequent upon a decreased demand for their product and have found little relief from the prevailing high cost of labor and supplies. Such demand as there was for the metal has been met from surplus stocks accumulated during the war, from quicksilver originally sold abroad but resold in this country, and from imports.

The average price of quicksilver in 1920 per flask of 75 pounds, as quoted by the Mining and Scientific Press for the San Francisco market, was \$79.66. The highest monthly average was \$100. in April, and the lowest was \$52 in December. The price held up fairly well to the end of August, but then fell steadily to the end of the year.

SALT LAKE MINING STOCK QUOTATIONS

The range of the market from March 28, 1921, through to April 9th, 1921, inclusive. Quotations furnished by J. A. Hogle & Co., direct wires to all leading markets, 169 South Main Street, Salt Lake City, Utah, and ground floor Eccles Building, Ogden, Utah.

Stock	Open	High	Low	L. S.	CLOSING			Stock	Open	High	Low	L. S.	CLOSING		
					Bid	Asked	Sales						Bid	Asked	Sales
Alta Con.	.01 3/4	.01 3/4	.01 1/2	.01 1/2	.01	.02 1/4	2,000	Logger	.01	.01	.01	.01	.00 1/2	.00 3/4	1,000
Alta Mich.					.01	.02		Monzonite	.01 1/4	.02	.01 1/4	.02	.01 3/4	.02	53,000
Alta Tun.	.05 1/2	.09 1/2	.04 3/4	.09 1/2	.09	.09 1/4	17,300	Mammoth					.21	.35	
Albion Cons.	.09 1/4	.09 1/4	.09 1/4	.09 1/4	.08	.08 1/2	150	Miller Hill					.01 1/2	.05	
Am. Con. Cop.	.01 1/2	.01 1/2	.01 1/4	.01 1/4	.01	.01 3/4	17,800	May Day	.00 1/4	.00 1/4	.00 1/4	.00 1/4		.00 1/4	3,500
Antelope Star	.03 1/4	.06 3/4	.03 1/4	.05 1/2	.05	.05 1/2	62,125	Mason Valley					1.25	1.50	
Bullion	.04 1/2	.04 1/2	.04 1/4	.04 1/4	.04	.04 1/4	24,000	Moscow					.02	.10	
Big Hill					.01 1/2	.03		Mich.-Utah	.02	.02	.01 1/4	.01 1/4	.01	.01 1/2	11,100
Big Cot. Coal.					.01	.05		New Quincy	.01 1/4	.04 3/4	.03 3/4	.05 1/2	.05 1/4	.05 1/2	141,900
Beaver Cop.	.03 1/2	.05 1/4	.03 1/4	.04 3/4	.04 1/2	.04 3/4	76,000	Naildriver	.20	.20	.20	.20	.10	.23	1,100
Bay State	.35	.38 1/2	.31	.35	.36 1/2	.37	13,500	Neva							.00 1/2
Black Metals	.03 1/4	.03 1/4	.03	.03	.02 1/2	.03	2,000	No. Standard	.05 1/2	.06	.04 1/4	.05 1/4	.05 1/4	.06	21,640
Cent. Eureka					.01	.02 1/2		O. K. Silver	.03	.03 1/2	.03	.03	.02	.03 1/2	5,500
Cedar Talis.	.00 3/4	.01	.00 3/4	.01	.01	.01 1/2	800	Opohongo					.00 1/4	.00 1/2	
Colb. Rexall	.24 1/2	.24 1/2	.21 1/2	.21 1/2	.21	.22	7,800	Original Bannock					.00 1/4	.00 1/2	
Colo. Con.	.02 1/2	.02 1/2	.01 1/2	.01 1/2	.01 1/2	.03	3,700	Old Emery	.20 1/2	.21	.20 1/2	.21	.21	.25	10,750
Crown Point	.02 1/4	.02 1/4	.02 1/4	.02 1/4	.02	.03	1,000	Plutus	.22	.22	.21	.21 1/2	.21 1/2	.22	3,500
Cardiff	1.10	1.10	1.00	1.05	1.05	1.07 1/2	1,300	Prince Con.	.27	.27	.24	.26 1/2	.26	.27	14,800
Croff					.01	.03		Paloma					.01	.01 1/2	
Daly					1.50	2.10		Pioche Bristol	.01 3/4	.02	.01 3/4	.01 3/4	.01 1/2	.02	60,500
Daly West					2.75	3.25		Price Mining					.02	.05	
Dragon					.03	.07		Provo	.05	.50	.65	.05	.05	.08	2,000
Demijohn Con.	.00 3/4	.00 3/4	.00 1/2	.00 1/2	.00 3/4	.01	4,000	Rico Arg.						.00 1/4	
Emma Silver	.01 3/4	.01 3/4	.01 3/4	.01 3/4	.01 3/4	.02	5,000	R. P. Cons.					.00 1/2	.02	
Empire Copper	.05	.05 1/2	.05	.05 1/2	.02	.05 1/4	3,000	Rico Well.					.05	.25	
East. Prince						.00 1/4		So. Standard	.12	.13	.12	.13		.14	500
Emerald	.05	.05	.05	.05	.05	.12	1,000	Sells	.03 1/2	.03 1/2	.03	.03	.03 1/4	.04	11,100
Eureka Mines	.05	.05	.04 1/4	.04 1/2	.04 1/2	.05	17,250	Syndicate	.00 1/2	.00 1/2	.00 1/2	.00 1/2	.00 1/4	.00 1/2	6,000
E. Crown Pt.					.01	.01 1/2		S. K. Coal.	2.02 1/2	2.15	1.80	2.07 1/2	2.05	2.10	5,309
E. T. Coal.					.01	.01 1/2		S. K. Con.	.70	.98	.68	.85	.84	.85	6,250
E. T. Con.	.07 3/4	.08	.07 1/2	.07 1/2	.07 3/4	.08	12,000	Sioux Mines					.01	.03	
E. Antelope						.00 1/4		South Hecla	1.15	1.20	.95	.95	.91	1.00	2,050
Eureka Lily	.07 1/4	.07 3/4	.06 3/4	.07 3/4	.07 3/4	.08	44,800	Silver Shield	.12	.12	.08 1/2	.09	.09	.09 1/4	15,500
Gold Chain	.05	.05	.05	.05	.03	.10	500	So. Hecla Ext.	.02	.02	.02	.02	.01 1/2	.02 1/2	1,000
Grand Central					.22	.35		So. Iron Blos.						.03	
Great Western	.03 1/2	.03 1/2	.03	.03	.03	.03 1/2	1,500	So. Park					.01	.02	
Hamburg Mines					.00 3/4	.01 1/4		Tar Baby						.01	
Howell	.07 1/2	.07 1/2	.07 1/4	.07 1/2	.07 1/4	.07 1/2	2,200	Tin. Central	.01 1/2	.01 1/2	.01 1/2	.01 1/2		.01 1/2	1,000
Home Run	.01 1/2	.01 1/2	.01	.01 1/2	.01 1/2	.02	8,250	Tin. Standard	3.00	3.00	2.27 1/2	2.57 1/2	2.55	2.57 1/2	21,975
Iron Blossom	.17	.18	.17	.18	.15	.18	1,100	Uncle Sam						.02 1/2	
Indian Queen	.00 1/2	.00 1/2	.00 1/2	.00 1/2	.00 1/2	.00 3/4	1,500	Utah Con.						.02 1/2	
Iron King	.11 1/2	.11 1/2	.10	.11	.10 1/2	.12	6,450	Union Chief	.003 1/4	.03 1/4	.03 1/4	.03 1/4	.02 1/2	.05	1,000
Judge M. S.					2.50	3.00		Victor Mining					.01	.03	
Keystone						.45		Whirlwind					.00 1/2	.01	
King David						.04		West Toledo	.02	.03 1/2	.02	.03 1/4	.03	.03 1/4	38,600
Keno	.00 1/4	.00 1/4	.00 1/4	.00 1/4		.00 1/4	1,000	Walker Mining	2.10	2.12 1/2	2.10	2.12 1/2	2.10	2.50	200
Kennebec					.07	.12 1/2		Woodlawn	.07	.07	.06	.06 1/4	.06	.06 1/2	4,500
Lehi Tintic	.04 1/2	.04 3/4	.03 1/2	.04 3/4	.04 1/2	.04 3/4	25,500	Yankee Con.			.03 1/2	.04 1/2		.02	
Leonora	.04 1/2	.04 1/2	.01 1/2	.01 3/4	.01 1/2	.02	44,177	Zuma	.04 1/4	.04 1/2	.03 1/2	.04 1/2	.04 1/4	.04 1/2	5,000

ORE SHIPMENTS.

For the two weeks ending on the 8th the mines of Park City, under restricted production conditions, sent to market 3,304 tons of ore as follows:

Judge Allied Companies	1,754
Ontario Silver Mines	438
Silver King Coalition	1,112

Tintic District—Within a few days a number of Tintic producers, as a result of smelter and shipping conditions, have discontinued production; but for all that the output for the two weeks ending on the 8th make a good showing, the total number of carloads of ore being sent out reaching a total of 282, as follows:

Tintic Standard	105
Chief Consolidated	56
Dragon Consolidated	24
Iron King	29
Iron Blossom	16
Swansea Consolidated	9
Eureka Hill	3
Grand Central	7
Sunbeam	3
Victoria	7
Eagle & Blue Bell	9
Alaska	1
Bullion-Beck	4
Gemini	3
Colorado Consolidated	1
Gold Chain	2
Centennial-Eureka	3

Pioche District, Nevada—Four shippers from this district sent out 1,531 tons, as follows:

Virginia-Louise	814
Combined Metals	145
Bristol Silver	355
Black Metals	220

BOSTON STOCK QUOTATIONS.

APRIL 9.	Bid.	Asked.
Bingham Mines	8	8 1/2
Daly West	2 3/4	2 3/4
Mason Valley	1 3/4	1 3/4
Utah Apex	2	2 1/4
Utah Consolidated	3 1/2	4 1/4

SAN FRANCISCO MINING STOCKS.

April 9.	Bid.	Asked.
Booth .....	.03	
Blue Bell .....	.01	
Combination Fraction .....	.02	
Goldfield Con. ....	.06	.08
Jumbo Extension ....	.06	.07
Lone Star .....	.04	
Silver Pick Cons. ....	.06	.07
Yellow Tiger .....	.01	.02
Gold Wedge .....	.01	
Manhattan Con. ....	.01	.02
White Caps .....	.06	.07
Grandma .....	.01	.02
Spearhead .....	.02	.03
Crackerjack .....	.05	.06
Great Bend .....	.02	.03
Con. Virginia .....	.53	.54
Mexican .....	.18	.20
Ophir .....	.22	.25
Savage .....		.09
Sierra Nevada .....	.10	
Union .....	.30	.31
Belmont	1.20	1.50
Cash Boy .....	.05	.06
Gipsy Queen .....		.01
Jim Butler .....	.10	.12
Mon. Pitts Extension .....	.03	.04
MacNamara .....	.13	
North Star .....	.03	
Rescue Eula .....	.17	.18
Tonopah Extension	1.40	
West End .....	.95	.98
Nevada Hills .....		.01
Round Mountain .....		.18
Tonopah Divide	1.16 1/2	2.30
Croesus .....	.50	

METAL MARKET, APRIL 9.

Silver, domestic .....	.99 1/2 c
Silver, in London .....	.33 3/4 d
Copper .....	.12 3/4 c
Lead, New York	\$4.25
Spelter, St. Louis	\$4.65 @ 4.70

FOR SALE, MINE PROSPECT—Six full claims, on two veins, in one body, on the Middle Fork of the American river, in Placer county, California. In section 20, range 12, township 15. It is a footwall vein and more than 12 feet wide and the quartz runs good. For particulars, address JOHN W. CAIRNS, Gishorn, Tooele County, Utah.

NEW YORK STOCKS.

April 9.	Bid.	Asked.
Am. S. & Refining	37 3/4	37 3/4
Cerro de Pasco		25 3/4
Chino Copper	21	21 1/4
Ontario Silver		4
Ray Consolidated	12 1/4	12 3/4
Nevada Consolidated	10 @	10 3/8
Utah Copper	48 1/2	

ASSESSMENTS PENDING.

Eureka Bullion Mining Company, 1/2 c a share. Delinquent May 6. Sale day May 25.
 North Standard Mining Company, 1c a share. Delinquent April 30. Sale day May 25.
 Rico-Argentine Mining Company, 1c a share. Delinquent May 2. Sale day May 25.
 Silver King Consolidated Mining Company, 10c a share. Delinquent May 16. Sale day June 8.
 Three Kings Consolidated Mining Company, 2c a share. Delinquent May 14. Sale day June 15.
 American Mining & Exploration Company, 1/2 c a share. Delinquent April 25. Sale day May 16.
 Bingham Centennial Mines Development Company, 1c a share. Delinquent April 20. Sale day May 20.
 Free Gold Mining & Milling Company, 1c a share. Delinquent May 2. Sale day May 31.

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SINGLE COPIES 15 CENT

A Trip Through the Uintah Basin (Part XI)

BY PROF. EARL DOUGLASS*

That night the party stayed at the Ute Oil Shale camp, which is located on a high bench about five hundred feet above the White river. They spent a pleasant evening and were most courteously entertained by the superintendent, who not only possesses a pleasing personality, but is a highly educated gentleman. It is said that he has held important positions in colleges, but prefers, for his own health and pleasure, a free life.

After breakfast it was decided that those who wished to go deeper into the problem of the origin of the gilsonite veins should go eastward to the next lode or vein and follow it down into the canyon, like the bears that went over the mountain "to see what they could see."

Still Seeking Gilsonite's Source.

The professor said: "I would like to have you follow down the canyon at the head of which we opened the little veins yesterday, and see what can be learned there; but I have reasons for wishing you to first examine the Chapita vein, I think it is called."

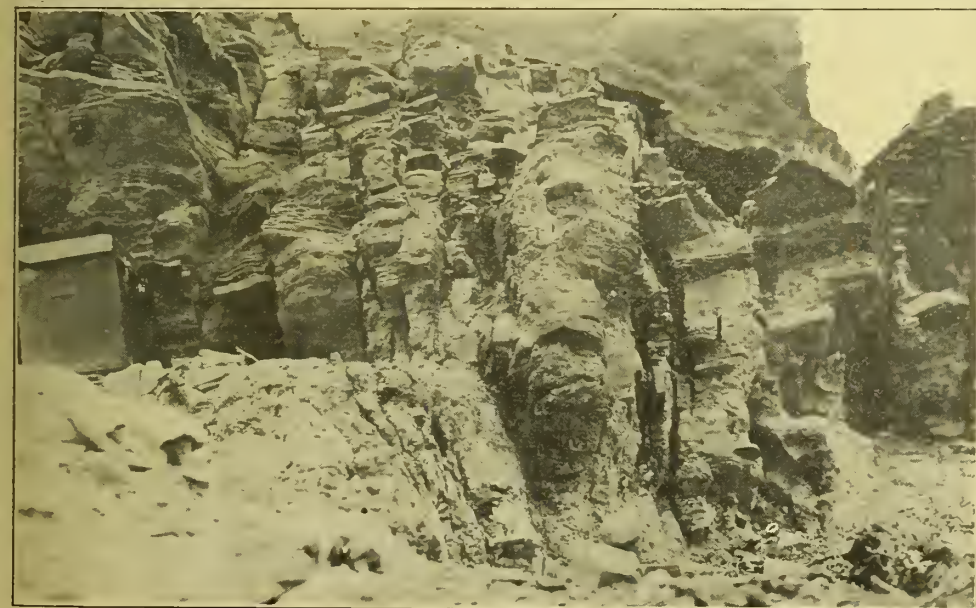


1—Ute Oil Camp, looking southwest; White River canyon beyond the bench; camp and nearer hills beyond the river is Green River formation. Higher bad land hills in distance are Uinta deposits.

long to reach the place where the road crossed the vein, as it was only about two and one-half miles. Although this was an upland bench and mostly covered with soil and a semi-desert vegetation, the direction of the vein could be easily seen by the assessment holes which occurred at intervals along its course. It was followed along its eastward trend to where it should go over the sloping brow of one of the side canyons of White river. Here the rock was principally sandstone—one of those peculiar, large, cross-bedded, thick masses, or lenses, of sandstones which are often nearly or quite surrounded by the shales of the Green river formation.

Several members of the party had prospecting pick-hammers and some had larger picks and they began digging to uncover the vein. Near the bottom of the sandstone, a little above the shale, the vein had split and become more irregular.

On reaching the steeper part of the canyon there was disappointment at first, as there had been the day before, for it looked as if the soil and debris had covered the downward extension of the vein as it could not be traced and studied. Some continued



2—Veinlets of gilsonite on the face of Green River cliffs. The main vein, of which these undoubtedly are "feeders," comes down from above to the right of the dim cliffs near the right hand upper corner of the picture, about 2½ miles northeast of the Ute Oil Shale plant on White River.

*Geologist for the Carnegie Museum, Jensen, Uinta County, Utah.

Though there was no auto highway—only an unworked wagon trail—it did not take

digging farther and farther down the hill while others followed the exposures of the Green river shale along the cliffs to the eastward, examining joints, fractures, bedding planes and the shales themselves for signs of asphaltic material which would indicate the origin of the gilsonite.

Then some of the party dropped to a lower level and were following the face of an escarpment backward toward the vein when one exclaimed:

"Look here! Isn't this it? Look at the little black stringers!"

"Yes, and look at this," exclaimed another; "there are pockets or cavities filled with it! Here it is all along the ledge!"

Over on the other side of the vein near the foot of a steep escarpment groups of anxious explorers were examining the bare

sandy shale. Beneath was a massive rock, nearly white on the surface, which was dotted with innumerable black spots of gilsonite. Pieces were broken from the rock and the broken surfaces were nearly black, as if saturated with asphaltic residue.

"Look at this!" exclaimed one or two who were a little below and farther to the south.

Another Discovery is Made.

"What is this that stains the rocks and makes them look so greasy? It looks almost as if you could see the oil oozing out."

"It does look like it, doesn't it?" replied the chemist. "Let us see if we can tell what it is. Take some that is stained the most and pound it to a powder with a hammer. We will put it in a small glass half full of water and set it on this shelf for a while."



3—Horizontal "blanket" deposit of gilsonite near vertical vein and near top of Green River formation; also rock with spots of asphaltic material. The darts point to gilsonite layer. Side canyon of White River, about five or six miles above White River stage station, Uinta railway.

rocks and expressions like the following were heard: "There they are!" "It's just what we were looking for!" "Isn't it just wonderful!"

More Asphaltic Veinlets Disclosed.

Here there were parallel vertical fissures varying in thickness from that of a cardboard up to an inch or more, and these were filled with hard asphaltic material which was undoubtedly gilsonite. There were a few pockets and occasionally a thin, paper-like horizontal stringer along the bedding planes of the shale.

A little farther to the westward under an overhanging cliff and near the bottom of the sandstones, or sandy lens, there were lenticular cavities several inches in diameter, some of which were partly filled with hydrocarbons associated with some crystalline mineral, apparently gypsum.

There was one bed of gilsonite, a local blanket layer, lying between the beds of

When a piece was broken out it proved to be gray, thin-bedded shale which easily split into laminae, but the outer weathered surface was coated with what appeared to be greasy dirt, which concealed the thin layers. A part of this, when ground, was put into hot water from a thermos bottle. The chemist then took a test tube from his little grip, put in a spoonful of the powdered shale and then, taking out a bottle, poured in enough liquid to cover the shale. He then stirred the mixture well.

"What is that in the bottle?"

"Chloroform; we will set this up by the other glass and come back in fifteen minutes or more. Now give me a little piece of the spotted rock that is white on the outside and nearly black on a freshly broken surface."

He put this in a test tube and poured chloroform over it. He then held it up, his eyes sparkling. "Watch it," he said.

"See, it's getting dark!"

"It has a reddish color."

"It's getting darker all the time!"

"What is it?"

"We will see later. We will put this with the other. This will be our chemical laboratory for a while. You come now, look around, but don't go far. It looks very simple, but we are trying to solve a problem of stupendous importance."

It was soon found that in nearly every place where the strata were well exposed it showed veins of asphalt and stains on the rock, etc.

Getting Near to Nature's Laboratory.

"It begins to look as if we were getting pretty near to nature's laboratory, doesn't it? Are you satisfied now that we are near the source of the veins?" remarked one man to the gentleman who said the day before that he wanted to get to the bottom of the veinlets and see where and how they were formed.

"We seem to be getting near, but we will see what Mr. Chemist says about his tests, and I want to ask the geologist where the oil comes from to make these hydrocarbons."

In about twenty-five minutes the chemist called, and in a few minutes the greater portion of the party was assembled at the open air laboratory.

"I thought," said one lady, "that all the natural sciences except chemistry could be studied outdoors, and now I see that can, also."

Conjecture Follows Tests Made.

"It can, to a certain extent," said Mr. Chemist. "Now look at this glass. You can see there is a kind of scum on top of the water. I shake the glass and it doesn't ripple like water, but shakes in a mass. I will light a match and see if it will burn. You see it doesn't burn, but spreads on the water and becomes smooth in appearance and is iridescent, something like oil. Notice the white fumes and the rank, unpleasant, smothering or choking odor. Can any one tell what it is?"

"It smells just like paraffine when I melt it on the stove to coat cheese and seal jelly glasses," a lady answered.

The chemist smiled.

"Let us see. There is something that we know is paraffine. We will put a very small piece in a glass and pour hot water over it, as we did the sample of shale. See; it comes to the top and acts in the same way. Now, if the first test shows paraffine, what does it prove?"

"It proves that oil has been here the same as the asphaltic residue proves it."

"Perhaps there is oil here yet," some one remarked.

"Let us see. Here is the test tube with the same substance treated with chloroform. What do you see?"

"A dark ring on top of the chloroform. Is that paraffine?"

"We will see. In another test tube I will put a little piece of paraffine and pour chloroform over it. You see it dissolves. Do you see anything on top?"

"Yes; we see a ring, but it is perfectly clear and colorless."

"The dark ring is crude oil," a gentleman asserted.

the application of heat. There is no oil in it now."

"Where does the material for the gilsonite veins come from then? And the paraffine?"

"Wait a minute," smiled the chemist. "I see a controversy coming, but we must keep cool, like a jury, until the evidence is all in. We are out to study nature at first hand and see with our own eyes. Errors or un-

COMPANY FORMED TO DEAL IN OIL PRODUCTION ROYALTIES.

A group of local bankers appear among the incorporators of the United States Royalties Company, a concern which has just been incorporated here to deal in royalties in oil production specializing in Utah oil fields. The incorporators besides B. C. Morrison, president, an oil operator from Casper, Wyoming, who has been securing Utah oil leases for the past year and a half, are Leo F. Tietzen, Arthur Davies and J. A. Mallia, who are with the National Copper bank, and W. F. Earls of the National Bank of the Republic.

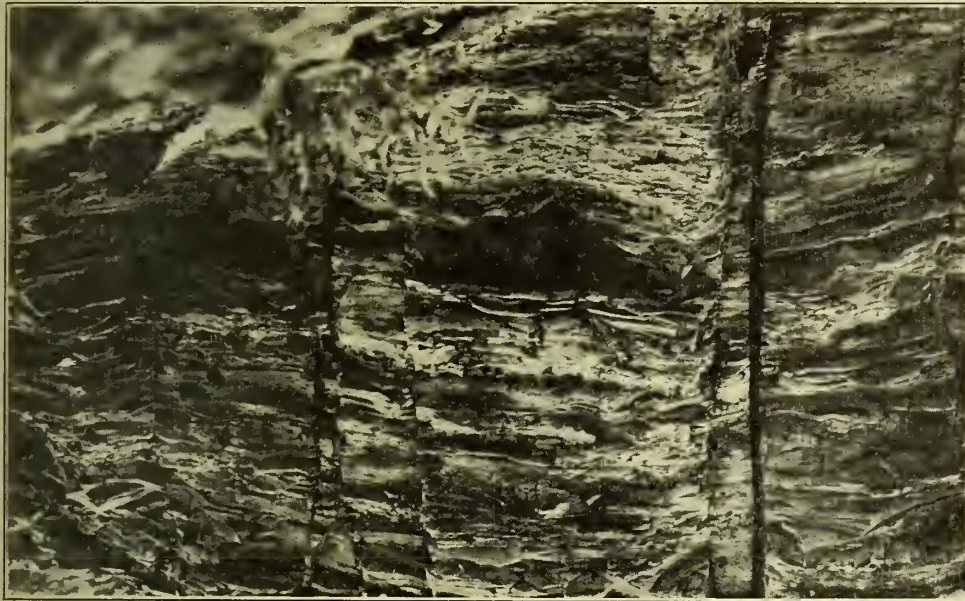
According to Mr. Morrison the company holds royalty rights ranging from two and a half to seven and a half per cent on a number of permits in the San Rafael, Circle Cliffs and Woodside structures on which drilling deals have already been made with financially responsible companies.

The company is capitalized for \$250,000, which is divided into 1,000,000 shares of stock with a par value of 25 cents a share. Permission to dispose of \$25,000 worth of the stock at par without paying any commission on sale has been granted by the state securities commission. Mr. Morrison said the application was granted following the showing by officials of the company that all of the royalty rights so far acquired by the company were purchased for 250,000 shares or one-fourth of the company's capital stock, and that 750,000 shares remain in the treasury to finance operations.

The company has opened offices on the top floor of the Clift building, in the offices formerly occupied by the Matador Oil Company, which is one of the Dutch Shell subsidiaries, and is having a large geological and contour map of western states made that will show locations and approximate depths of wells drilling in various fields besides area of proved structures and volume of production from wells, according to Mr. Morrison. This map will be available to the public, Mr. Morrison said, and will be prepared by competent geologists. Mr. Morrison said W. R. Calvert, well known Salt Lake oil geologist, will make the company's geological investigations in Utah, Wyoming and Montana.

The United States treasury holds \$58,000,000 of Polish bonds, taken in exchange for food and clothing sold to the Poles.

The total production of electric power by public utility companies in 1919 was thirty-nine billion kilowatt-hours, according to the United States geological survey. Of this power 62 per cent was produced by fuels—35,000,000 tons of coal, 11,000,000,000 barrels of oil, and 21.7 billion cubic feet of gas—the remainder by water power.



4—Veins of Gilsonite in Green River Shale, below Exhibits 2 and 3.

Oil Shales Brought in Evidence.

"No, sir," related a fat man who had just appeared on the scene, puffing.

"Excuse my abruptness, but these are the famous oil shales of the Green River formation and they contain practically no oil as such. I have been examining the shales and have some fine samples. Look at this! It will probably go fifty gallons to the ton—that is, it will produce it by destructive distillation. The process has to be finished by

truths may get into books, but never into nature. Books are most useful as guides if we always have this in mind. We will have to regard books as the old fellow did providence. He was driving down a very steep and dangerous hill with his family in the buggy. The old lady was very much afraid, but he tried to console her with these words: 'Mother, we'll trust in providence until the breeching breaks'."

part of Uinta county. R. S. Colett now has a force of eighty men at work constructing a road from Rainbow, the terminal of a branch road of the Uinta Railway Company, to Willow Creek where the plant will be built, which is a distance of from fifty to sixty miles. It will cut the road distance over the present road in half. Construction of the plant is expected to follow very quickly after the road is finished. Farmers and sheep and cattle men of the Willow Creek section will benefit by the road.

Considerable interest has been created here by the striking of gas in the Carbonero field. Captain Colley of Mack, Colorado, has shipped two standard rigs to the field and will start drilling very soon. Moving pictures of the shale plants and deposits and the prospective oil fields in this district have recently been taken and will be exhibited in motion picture theatres throughout the country.

OIL SHALE OPERATORS

AROUND WATSON ARE BUSY.

A dispatch from Watson, Utah, a few days ago, says: The Ute Oil Shale Company plant, the largest in this section, is expected to start operations on May 1. Construction of the plant, which is located thirteen miles north of Watson on the White River, was started four years ago and it is now completed and ready to run. It has capacity sufficient to treat 400 tons of shale every twenty-four hours. Tests of the company's shale deposits show one barrel of oil to the ton.

The Western Shale Company's plant, which is six miles east of Watson, is in steady operation and producing from four to six barrels of oil a day. The plant is small but is operating very successfully.

A shale plant is to be built in the Willow Creek section which is in the southeastern

Electric Gold Mines Co. Making Producer at Weepah

By JAMES F. O'BRIEN

Tonopah, Nevada, April 23.—In the low, rolling hills of the Weepah district, to the southwest of Lone Mountain, and twenty-three miles in an air line southwest of Tonopah, the Electric Gold Mines Company is developing a mine that bids fair to prove one of the big gold producers of the country. This is the opinion of a number of conservative mining engineers and practical mine operators who have examined the property within the last few weeks.

The ore at the Electric is not of the sensational high grade type that made Goldfield famous—though high assays are not unknown—but there is a large tonnage of low-grade ore that should be easily worked at a good profit.

There are two vein-systems—known as the Electric and the Fissure veins—that traverse the six claims of the Electric Gold Mines Company. There has not been much work done on the latter, but the Electric vein, or mineralized zone, has been exposed by shafts, prospect holes and trenches for a distance of over 1,500 feet in length. From surface prospect holes it would appear that the mineralized zone is at least 200 feet wide, though the greatest width so far exposed at depth is seventy-one feet, but neither wall is in sight in this crosscut from the bottom of an eighty-five-foot shaft. As to the ore and values found in the different workings, the following is taken from the report made by Leon M. Hall, a consulting engineer of repute, after a recent sampling and examination of the Electric mine:

Engineer's Report is Favorable.

"The ore shoots are apparently distributed over the entire area, * * * but it is safe to say that the entire area is sufficiently well mineralized to assure a large tonnage for many years. * * * A crosscut has been driven in ore from the bottom of the main shaft for a distance of seventy feet without exposing either the foot or hanging wall, and at No. 4 shaft at a point about 500 feet to the south of the main shaft a crosscut was driven forty-seven feet without finding the walls or getting out of ore of a commercial value. Similar conditions hold true for shafts No. 1 and No. 2, with crosscuts respectively eighteen and twenty-one feet in length.

"These workings are all in ore, both sides and bottom, while all of the dumps are of similar material and can be cleaned as ore of a commercial grade."

Elsewhere in his report Mr. Hall says: "The assay values obtained from samples taken from the workings on the Electric vein run from \$1 to \$50 per ton, with from

\$6 to \$8 as a fair average of the general run of the ore exposed in the Electric vein system." That is the average value still claimed by Frank E. Horton, president of the company, though it is known that much higher grade has been found since Mr. Hall made his examination.

When the visit was made to the Electric mine for the purpose of examining and gathering data for this article, four samples were taken from the different deeper workings for assay. This was to satisfy personal curiosity. The assays were made by Young, of Reno. One proved to be genuine high-grade, and so much better than the average claimed by Hall and Horton that the exact figures will not be given here, lest they prove misleading. The other three ran \$20.80, \$5.00, and \$21.20 respectively—an average of \$15.66 per ton.

Operating Costs Will be Modest.

With goods running to the Electric from Tonopah, Goldfield and McLean's station—with ample water for milling and domestic purposes less than six miles away—with an electric power line and a telephone line that can be tapped within four miles of camp, and the Tonopah and Goldfield railroad but ten miles distant—the conditions for economical mining and milling are excellent. Mr. Hall figures the cost of mining and milling the ore with adequate facilities at "not to exceed \$4 per ton." But Sol Camp, who developed the Elkton mine at Cripple Creek and later the January mine of the Goldfield Consolidated, and who is now in charge of the Electric—believes he can cut the estimates on mining costs very materially. Camp says that the big ore body can be mined by the "glory-hole" method, and that a very few miners can keep a mill of large capacity steadily supplied with ore.

Hoisting Equipment Being Installed.

A good hoist is now on the ground and it is Mr. Camp's intention to sink the main shaft 200 or 300 feet after it is installed, and to drift and crosscut until the limits of the ore are more definitely determined. As stated before, the values have increased appreciably as depth is gained, but even if there is no increase in width and value, another 200 or 300 feet in depth will greatly increase the value of the Electric mine if the vein persists. That it will persist to depth there is no doubt in the minds of Mr. Hall and others who have studied the geology.

There is not space to reproduce in full Mr. Hall's report on the geology, but the following sentence taken from it tells the story: "The structural characteristics are

those that accompany deep seated, permanent vein formations."

The concluding paragraph of Mr. Hall's full report is the most important, perhaps, to those interested in the mine, and is as follows: "If the veins improve with depth, or even maintain their present values, the mine is sure to rank with the big producers as depth and development bring to light the latent possibilities of this district."

Frank M. Ish, who bought a half interest in the San Francisco and Oakland baseball clubs with money made in Goldfield, and who also was a pioneer of Cripple Creek, is another of the old bunch that has become enthused over the showing in the Weepah district. He has secured a group of claims adjoining the Electric and, though the baseball season has opened, he has been here for some days arranging for their development. His friends will realize that it takes something big to keep him away from a ball game when his own club plays.

IDAHO SECTION'S REDUCED FREIGHT

New rates on coal, ore and oil, shipped from or into this county over the Gilmore & Pittsburg railroad have been given a most wholesome shave, bringing things generally back to pre-war basis, and in some instances the new rate is the lowest in the history of the road, says the Salmon Herald of recent date. By the new schedule, coal from all points in Wyoming to Salmon is placed at \$5.40 a ton, the same as it was before the war. The reduction per ton for the respective points is as follows: Salmon, \$2.35; Leadore, \$1.74½; Gilmore, \$1.85.

At present this cannot affect the retail price of coal at Salmon, because the local coal dealer buys from Utah, and the coals of Utah do not appear to be affected by the new rate. However, arrangements are under way to bring the Utah roads under the same favorable schedule, and it is expected that something along this line will soon be accomplished.

Ore rates from Lemhi county points to any of the smelters of Utah have been amazingly cut, the reduction from Leadore, Tendoy, Baker and Salmon ranging from \$2.90 per ton on lowest grade ore to as much as \$7.40 per ton on ore that runs as high as \$75 in mineral contents. Now \$20 ore can be shipped for \$4.75 per ton; \$30 ore for \$5.50; \$40 ore for \$5.88; \$50 ore for \$6.50; \$65 ore for \$8; 75 ore for \$8.75; \$85 ore for \$10; and \$100 ore for \$12. These rates apply to all stations in Lemhi county.

The new rate on crude oil from Laramie, Wyoming, is 87 cents per 100 pounds, and from Salt Lake City it is 59 cents, the reduction being about 40 per cent from the former schedule. On refined oil the rates from the respective points above named are \$1.05½ and 80c per hundred, showing a somewhat similar per centage reduction.

Deep Mining at Goldfield For New Rich Orebodies

By A. J. MOORE

Goldfield, Nevada, April 25.—One of the most comprehensive plans for thorough underground explorations at great depth in the history of mining is now well under way at Goldfield. Like all other such projects advanced by men of foresight and vision and involving the expenditure of large sums of money it has its opponents. It is yet within the memory of many Nevadans when one of the world's—at the time—greatest mining engineering feats was classed as idiotic and its projector, Sutro, was termed "the crazy Dutchman" and by many placed in the same class with the man with an airship. Yet in spite of the most heartbreaking opposition Sutro's tunnel became a reality and not a dream and many millions were added to the world's wealth.

No great mining camp ever started out as a deep mining project. The surface was first scratched and then a little deeper and then a little deeper until at last the owners became possessed with the idea of deep mining in earnest. Note the latter day development of every big mining camp, Leadville,ripple Creek, Grass Valley, Deadwood and other great producers. Some of the world's best mining engineers tell us that the same may be accomplished at Goldfield, and the project is under way on a basis that involves but light tax on each participant.

Magnitude of Goldfield Deep Project.

From the knowledge gained from the workings of the various mines came the idea that the ore bodies of Goldfield were waiting for riches at depth. The expense of such work was beyond the finances of any one company or individual, therefore a combination must be made and with that, when accomplished, must be an area of such extent as to warrant so great an expenditure for the possibilities of great reward must be in proportion. This subject was a matter of discussion among the most prominent mining engineers and men of Goldfield for many years and finally had its culmination in the consolidation of the Goldfield Merger Mines Company, Reorganized Atlanta Mines Company, Reorganized Blue Bull Mining Company, C. O. D. Consolidated Mining Company and the Goldfield Mining Company into the Goldfield Deep Mines Company. This was accomplished by the purchase of the properties of the companies mentioned by the Deep Mines Company. In addition five patented mining claims were purchased from the Goldfield Consolidated Mining Company and three from the Milltown Mining Company. This gave the Deep Mines Company thirty-six patented claims, an area of over 100 acres.

I may not have the figures correct to a foot, but the work in the various shafts of the Goldfield district shows depth about as follows: Red Hill, 800 feet; Combination, 450 feet; Florence, 1,200 feet; Development Company, 600 feet; Mohawk, 1,000 feet; Clermont, 1,200 feet; Grizzly Bear, 1,400 feet; Atlanta Winze, 1,900 feet; Laguna, 700 feet; Booth, 500 feet; Jumbo Extension, 1,000 feet; Merger, 1,750 feet; Kewanas winze, 840 feet; Spearhead, 1,000 feet; Grandma, 1,000 feet; Victor, 700 feet; and Blue Bull, 700 feet. An examination of these shafts with their combined miles of crosscuts, drifts, winzes and upraises formed an interesting study to the engineers. It was the consensus of opinion that the ore bodies of Goldfield did make for deep mining.

The services of Corrin Barnes was secured and he gathered together all the data of the various companies concerning the position of the veins, rock formations, trend of ore bodies as exposed and their correlation one with another. The result of this work was the selection of the Combination claim of the Goldfield Combination mine as the point at which to sink to depth. Operations are now under way at this point with the view of going to a depth of at least 2,400 feet.

Engineer Barnes' Opinion Quoted.

Reports by mining engineers are usually very dry reading, particularly for the layman, but Mr. Barnes' report is in part well worth quoting. He says:

"On this shale surface much rich ore was taken out and many people concluded that because the vein flattened out on to the surface that it extended downward no further. The Spearhead has now followed this vein continuously from the shale surface entirely through the shale along a flat dip and entirely into the underlying alaskite so far that the vein shows now at the bottom entirely in the alaskite. It is there formed of silicified alaskite with quartz and alunite filling the fissures for a thickness of twenty feet and the footwall not yet penetrated. The vein at this place shows many stringers and irregular masses of pyrite carrying copper and gold. These conditions prove that this vein is a continuous fissure in the earth, and that its continuity on its course and dip is irrespective of the different rock formations through which it cuts, and that it depends entirely upon the fissuring for its continuity and extent. Several of the richest ore bodies have occurred where it penetrates the shale, as in the Jumbo Extension and Grizzly Bear workings."

It might be remarked in passing that

since the above was written the work in both Spearhead and Grandma have still further demonstrated the new theory that the vein system of Goldfield does penetrate the alaskite and while no commercial ore body has yet been discovered, bunches of ore have been found in both Spearhead and Grandma. In some instances these bunches have shown very high assays. Yet the workings of neither of the above companies have approached near one-half the depth that it is proposed to go in the new exploration of the Deep Mines property.

Possibilities of Enterprise Summed Up.

The possibilities of the Deep Mines Company may be summed up in that they are following a plan for deep exploration that has been approved by mining engineers, geologists and practical mining men and their holdings are of such extent that a vast area is presented for exploration. It is stated that the company has over 12,000 stockholders, and while a vast sum of money is needed to carry the project to completion the burden will fall lightly on the individual shareholder. The advisability of assessable companies has already been demonstrated in Goldfield, Tonopah and other mining camps and some of the now most successful oil companies were brought into their own by the assessment route.

That the Deep Mines Company means business is evident from the substantial manner in which they are doing their work. A concrete collar down to solid rock has been set. The shaft is eleven feet 6 inches by five feet, and affords space for two hoisting compartments and a utility compartment. Concrete piers with base ten by ten feet have been set for the eighty-foot steel head-frame, and a solid concrete foundation set for the 250 horsepower double-drum hoist. All of this is preliminary work and expensive.

For the time being a 75 horsepower hoist and timber head-frame is in use, it being sufficient for needs down to the 800-foot level, where a station will be cut and this equipment moved underground. Then the big eighty-foot steel head-frame and 250 horsepower hoist will be put into commission and used as a permanent equipment from that time on. When this is all installed it will be one of the biggest and most efficient equipments of its kind in the United States. It is also expensive, but is all on the property and paid for. The eighty-foot steel head-frame now standing at the Merger shaft, with all its equipment, became the property of the Deep Mines Company at the time of the consolidation of the companies.

Work is Now Being Pushed.

It will be seen from the above that the Deep Mines Company is laying its plans along lines that indicate extensive work and at great depth. The shaft is now down 375 feet. Two shifts of nineteen men are now employed, it being the intention to add an-

other shift soon. A drive will be made to get to the 2,400-foot level at the earliest possible moment and then will begin the most comprehensive exploration at great depth ever undertaken in a gold camp in the United States.

The whole project is the result of a consensus of opinion of the most talented min-

ing engineers in the world, and wherever opposed it is by men whose minds are too narrow to grasp the importance and scope of so great a project. It is a matter of history that all such broad extensive plans have met with opposition, but eventually brought success and riches in proportion to the opposition.

Big Operators "Start Things" In Kingman Mining Region

By WM. P. DEWOLF

Kingman, Arizona, April 22. That the precious-metal bearing country for which Kingman is the outfitting point, is to be the scene of a mining excitement of proportions is daily becoming more evident; and as the gold and silver enriched veins which are the basis of the growing investment interest are well mineralized and well defined it appears certain that mining effort will be both extended and profitable. These indicators of permanent prosperity stand plainly to the fore amid the animated scene which feature the initial movement of mining men and investors to this section and are being favorably commented upon by them. To the gold miner the country extending from Outman to the River range offers the stronger appeal, while to the silver miner the call of the Cerbat and Wallapi ranges is the more potent

C. O. D. Mill Solves Ore Treating Problems.

The increasing interest attaching to mining affairs in the Cerbat and Wallapi ranges is based upon the practical demonstration afforded at the C. O. D. mill that the refractory ores of the Kingman silver belt can be successfully and profitably treated. For a long period of years the reduction problem presented by these ores was without a "key" and greatly retarded the development of what is acknowledged to be one of the richest silver-bearing areas in the United States. Time and again chemists and "ore sharps" failed in their efforts to solve this knotty problem, and finally the belief became general that it was unanswerable. Then Morris B. Dudley a former Nevada mine operator, and his assistants, worked out the proper reduction formula and released the silver content of the ore from its base-metal matrix.

For several years Mr. Dudley, backed by eastern capitalists, possessed of the faith that moves mountains, subjected the refractory ores of the Stockton Hill section of the Cerbats to chemical analysis and treatment test. The cost of this research work totaled several hundred thousand dollars but was amply justified as the C. O. D. mine and mill are now on a paying basis. Like Columbus with the egg, Dudley and his assistants have

shown the unbelievers how it was done. Now, anybody can do it.

With the solving of the treatment problem the Dudley interests, as they are called, erected a modern, electrically driven reduction plant near the collar of the C. O. D. shaft at an approximate cost of \$200,000, and equipped the mine itself with electrically driven machinery. In addition to this comfortable quarters were built for the miners and an easy-graded road was constructed from the mine to the main highway to Kingman. All of the camp buildings are lighted electrically and all of the top work, such as tool sharpening and the like is done with electric devices. The mine and mill plant is modern in every particular and is one of the most efficient ever erected in the mining areas of the west.

Mill Product Shipped to Utah Smelter.

The mill has an ore reduction capacity of 125 tons daily and went regularly into commission on March 15th, last. It is now handling in excess of 100 tons of ore a day and is saving better than 90 per cent of the values.

Forty tons of concentrates, having a value of from \$200 to \$240 a ton, are being shipped to the smelter at Midvale, Utah, at six-day intervals. The precious-metal content runs about two ounces of gold and the balance silver. The ball type of mill, with regrinders, classifiers and flotation process, is used in the reduction of the ores. The mine and mill force at this time totals sixty-five men and is to be increased to eighty men not later than May 1st.

Mine in Fine Physical Condition.

Conditions in the mine workings are on a par with those at the surface. Above the 400-foot level the value of the ore in sight is estimated at better than \$1,000,000. On the 400-foot level the east drift is out from the shaft a distance of 450 feet and is in ore all the way. The same condition prevails in the west drift, which has a length of 420 feet. Between the two headings the vein has an average thickness of four feet and an average value of \$28-\$25 in silver and \$5 gold. The vein shows true and strong from surface to a depth of 400 feet, and there is

a pronounced increase in values at that depth. In fact, the ore in the bottom of the headings on the 400-foot level is the richest thus far opened in the mine. This condition indicates that even richer ore will be found when the vein is entered on the fifth level.

The shaft has been driven a depth of eighty feet below the 400-foot level, following the footwall of the vein, and while no in the ore shoot, is yet carrying values. The 500-foot objective will be gained in a few days. There a station and pocket will be cut preparatory to drifting east and west along the course of the vein. Cross-cutting and raising will attend this work for the purpose of blocking out the ore between the fifth and fourth levels. This work is expected to add largely to the ore tonnage in sight and will probably necessitate an increase in the ore reduction facilities.

Operating Syndicate Five in Number.

Mr. Dudley and his associates have been operating mines in the sections tributary to Kingman for the past four years. During that time they have spent more than a million dollars for mine development and machinery. Their holdings are extensive throughout the Cerbats and elsewhere and have an aggregate value running into the millions. They have financed their mining ventures without the assistance of others and have ample funds for the carrying out of their future mine development plans. There are five men in the Dudley syndicate all easterners of great wealth, and they are probably the largest individual mine operators in the state of Arizona.

SAMPSON MAGNESITE CONTROL CHANGES HANDS.

R. H. Moore, the Berkeley, California, capitalist who is owner of a rich 700-acre ranch at Fallon, Nevada, has recently bought control of the Sampson Magnesite Company of California. In this project he has associated with him A. F. Morrison and H. Fischl, both of California.

The holdings of the Sampson Magnesite Company are in San Benito county, California, and are said to be among the most valuable in the United States. It owns and controls over 1,000 acres and claims to have in sight 1,500,000 tons of magnesite, of which 750,000 tons are exposed in one deposit on Sampson Peak. This is said to be the largest individual deposit of high-grade amorphous magnesite in the United States. It is suitable for both plastic and refractory purposes.

In addition to the furnaces on the ground at the time of purchase, the new management under direction of R. H. Moore as president and general manager, will put in many improvements, including rotary kilns, crushing and grinding apparatus for producing materials. The company is rushing completion of the improvements as a large amount of orders are already on hand.

Camp of Silverhorn Is Rapidly Forging Ahead

BY JAMES F. O'BRIEN

Pioche, Nevada, April 25.—The phenomenal showings that have been made in the first few weeks of development work at the new camp of Silverhorn, twenty-two miles north of Pioche, have been added to by a remarkable find which was made a few days ago by J. C. Weir, of New York, on the property of the Nevada Silverhorn Company. Previous to this discovery the opening up of thousands of tons of ore that averages twenty ounces or better in silver to the ton, as well as the shipment of much ore to the smelter that runs from 300 to 500 ounces silver per ton, justifies the rush that is taking place in Silverhorn—especially when the facts are vouched for by a dozen or more prominent mining engineers from various parts of the country. But the new strike shows that the possibilities of the district have not been fully realized even by those on the ground.

Broker Weir Some Prospector Himself.

Mr. Weir, whose firm, Weir Bros. & Co., was the first to adequately finance a mine in the camp, was going over the property of the Nevada Silver Horn Company, which he controls. He had wandered some distance from the workings where they are sacking 10-ounce ore and sat down to rest upon a massive outcrop of quartz that was supposed to be barren of values. Notwithstanding that supposition Mr. Weir took a big sample and the assay from this showed values of fifty-seven ounces in silver per ton.

Since that day he has had much systematic sampling done of the big outcrop which is over 400 feet long and from twenty-five to seventy-five feet wide. The average of five samples taken was 87.5 ounces in silver per ton. Other samples across various widths have assayed 33.6, 81.6, 151.7, 109.7, 46.2, 17.8, 108.9, and 330.0 ounces silver respectively, per ton. At one place, at least, the ore will average a high grade mill product for a width of fifty feet.

Engineers Give Camp Approval.

It will be easier to believe there is no mistake in the foregoing figures when one quotes Thomas H. France, an engineer of high reputation. He was formerly field engineer for the Vogelstein interests and for years was on the staff of the American Smelting and Refining Company.

At a meeting in Silverhorn recently, which was attended by over a dozen other prominent engineers Mr. France stated that the outcrop on the Silver Horn is the largest and richest for its size that I ever have examined." He also quoted from his original report—upon the strength of which Edward A. Clark, president of the American

Lead and Zinc Company, and other Wall street financiers invested heavily—and mentioned one sample taken clear across thirty feet of the outcrop that went 33.3 ounces silver to the ton.

At this same meeting Robert Mulford—an engineer who graduated from Columbia, was a former associate of the late James B. Haggin and is now one of the principal owners of the famous Homestake mine—congratulated Mr. France upon his "conservative report," and declared that Silverhorn has the largest exposure of silver ore that the country has ever heard of."

H. A. Titcomb, one of the foremost geologists of the country, who has his New York office with A. Chester Beatty, committed himself to the extent that the ore bodies were among the biggest that he had ever seen. Many others present expressed themselves in words or effect similarly.

Among the engineers and mining men who were at the meeting in addition to those already mentioned, were: W. C. Geddes (who controls the Silver Dale, one of the high-grade shippers); Theo. H. M. Cramp-ton (whose report induced the Weirs to finance the Silver Horn); Frank A. Cramp-ton, Fred B. Church, R. M. Geppert, of Minneapolis; Henry Pollard, E. L. Norris, A. E. Bruce J. C. Weir, Peter Buel, Arthur Page, Judge Dan C. McDonald, Earl T. Godbe, E. H. Weir and Victor Huson. It is rare that so many prominent mining men get together at one time, especially in a camp so young.

Camp is Rapidly Building Up.

Silverhorn camp is growing as rapidly as lumber and other supplies can be brought in—the stock of lumber in Pioche was exhausted soon after the discovery of high-grade ore. At least eight sizable buildings, including business houses, are under construction or waiting for lumber. A telephone line connecting with Pioche is to be put in at once and a postoffice established as soon as possible. Fresh milk and cream—something new for a camp on the Nevada desert in its early days—will be available, as a dairy with forty cows is being moved from Ely. A good supply of spring water will be piped to the townsite, and there is plenty of wood for domestic use and small mining timbers.

SHASTA ZINC AND COPPER SELLS STOCK TO BUTTE SUPERIOR

The annual report of the Butte & Superior Mining Company for the year ended December 31 1920, shows net profits of \$187,928, or 65 cents per share, after de-

preciation and depletion. In 1919 the company earned a net of \$864,989, or \$2.98 per share; in 1918, \$628,348, or \$2.16 per share, and in 1917, \$2,450,686, or \$8.44 per share.

On account of the shrunken ore reserves, the directors thought it desirable, in addition to continuing development work as stated, to acquire for the company an interest in other proved ore bodies of a more or less similar kind.

Accordingly, 36,000 shares of the capital stock of the Shasta Zinc & Copper Company were purchased for \$360,000, being the original issue price. The Shasta Zinc & Copper Company is a Delaware corporation, with a total authorized and issued stock of 200,000 shares of no par value. The company acquired the property formerly owned by the Bully Hill Mines, Inc., located at Winthrop, Shasta county, California.

It is now estimated that there are approximately 80,000 tons of spelter on hand throughout the country and that the current production is at the rate of approximately 18,000 tons per month, with deliveries running at only about 15,000 tons per month. In the face of such conditions and even with a considerable reduction in the cost of material, supplies and labor, the outlook for an early resumption of production by the company is not promising.

The estimate of developed ore reserves as of December 31, 1920, shows 422,100 tons as compared with the estimate of 623,300 tons as of December 31, 1919, or a decrease of 201,200 tons, caused by the mining of 335,511 tons, less the amount of tonnage developed incident to the mining operation. Very little development work was done during the year, but upon the suspension of operations on November 10 it was deemed advisable to retain a small organization and a limited force of workmen in addition to those necessary for the proper maintenance of the mines and plants to do a moderate amount of development work on the lower levels.

In the litigation of the Minerals Separation, Ltd., versus the Butte & Superior Mining Company the situation remains as described in the last annual report. The additional details there referred to as being in the course of preparation were filed in due course and since that time no further proceedings on the accounting have been had.

The Shasta Zinc and Copper Company was organized last year by D. C. Jackline and associates, who acquired the property. A large tonnage of combined copper and zinc ore was developed in the mine and the company has erected a plant to volatilize the zinc, making zinc oxide, and reduce the copper and precious metals. The old smelting plant of the Balaklava Mining Company was purchased and used in construction of the Shasta plant. Recent reports from the mine have stated that the plant is virtually completed.

Another Gold Excitement Now Developing in Nevada

By A. J. MOORE

Fallon, Nevada, April 22.—The new gold strikes on the Black Reef claim of the Brohilco Mines Corporation are not only holding up, but show increased improvement with development. The excitement still runs high and prospectors are coming in from all parts of the country. Team load after team load of supplies go out from Fallon daily. Work has been going on in this neighborhood for several weeks, and every effort has been made to keep developments under cover, but the news got too big and came out and now those who were on the inside are telling the facts.

No end of claims have been located of which little has been said and less known, but among those who have done so much work that information cannot longer be withheld are: Wade and Reed on the Moose group, near the Black Reefs; Fife & Bill on the Southwestern group; Jack Davis, on the Quartz Mountain group, about two miles northeast from the Black Reefs, is down forty feet and reports values of \$53 across bottom of the shaft; George Clay, also on Quartz Mountain, is down eighty-five feet, and claims values around \$125, and will soon make a shipment to the Bruner mill. Mr. Clay also has several claims near the Brohilco. Bud Davis will soon start work on seven claims located on the Westgate road; Tom Mills has a group of claims between the old Illinois mine and the Silver Leaves claims of the Brohilco Mines Company. The old prospector, known throughout this country as "Bald Mountain Bill," has several holdings near the Brohilcos; Jack Coniff has a group joining the Black Reefs on the southeast; Jack O'Connor has a hoist ready to install.

The Silver Trailer, Costello group and O'Connor group are right at the town of Broken Hills. Then there are the Broken Hills Combination Company and the Broken Hills Consolidated Mining Company, each holding property in the district and which must not be confused with the Broken Hills Silver Mines Corporation being promoted by George Graham Rice. The Broken Hills Consolidated is owned by Fallon capitalists and Broken Hills Combination by Tonopah operators, while the Silver Trailer is controlled by several of Fallon's most prominent citizens.

New Excitement is Southeast of Broken Hills.

The new gold strike which has attracted so much attention is on the Black Reef claims of the Brohilco Mines Corporation, controlled by George Edson Porter and Dr. F. E. Harrison of Fallon. The Black Reefs

are located about four and a half miles southeast from the town of Broken Hills. Samples of the ore are at the office of Dr. Harrison in Fallon, and crowds inspect them every day. Every man who knows how is allowed to crush samples as he pleases and do his own panning. Each panning will show from fifty to over 200 colors. These samples were taken from the Black Reefs April 10th and 11th in the presence of a number of visitors from Fallon.

The Brohilco comprises five groups of several claims each. They include the Brohilco and Brohilco Fraction, near the Fife & Hill Southwestern group, the Brohilco group of four claims over by the O'Connor claims, where values as high as \$2,000 a ton have been found, and the silver Leaf group of five claims, on which there is a shaft down ninety-five feet, which has cut a four and a half-foot vein carrying a six-inch pay streak showing assays of \$472. A hoist is being installed here, and the shaft will be continued to the 150-foot level and then drift on the vein.

About 1,000 feet from this shaft is another down twenty-eight feet, over fourteen feet of which assays \$29.10, with a four-inch pay streak with values of \$145. Further over on Silver Leaf No. 5, chalcoprite, gold, silver and copper, with values of \$93.20 shows at the grass roots. On the double K's only location work has been done.

A mile or so south are the Black Reefs, on which only trenching has been done, but in every opening ore carrying free gold is found, and around there much of the excitement centers. While the trenching is only from two to four feet deep, the showing is such as would indicate a continuation of values to depth.

Black Reef Beats Them All.

Jack Coniff, who has followed every new strike of note for years, and who is known throughout Nevada as a reliable and substantial miner, says: "I have seen them all, but never before one to equal the Black Reefs."

Another property likely to soon make a mighty good showing is that of the Silver Doll Mining Company, controlled by Sam Wilcox and others of Reno. It is most favorably located and though only prospected sufficient to find ledges in place, the work done shows high values and warrants the expenditure of money for further development.

The Thompson group, owned by Dick Thompson, has already produced shipping ore some of which is claimed to run about \$1,000 a ton. Some of the specimens from

this group contain rare samples of horn silver.

In addition to the Silver Doll Mining Company property Sam Wilcox also controls the Second and the Second-Class claims. These claims are held under the name of Wilcox & Boyd.

Then there is the Highway group, owned by Matt Costello, the Powells & Shafer group, the X-Ray group on Quartz Mountain and the group at the head of Craig canyon owned by Walter Browder.

W. D. Nichols & Sons of Fallon also own several groups of claims scattered at favorable points all over the camp.

A POWERFUL NEW SOLVENT.

The universal solvent, the alchemist's dream of a liquid that should dissolve alike metals, stone, wood, earth, minerals, and every solid thing, is almost realized in a new liquid, with remarkable properties, described before the students of the department of chemistry of the University of Nebraska on February 24 last. We quote a bulletin of the American Chemical Society as abstracted in the American Exporter, using the report made by Dr. Victor Lenher, professor at the University of Wisconsin:

"Tests have shown that selenium oxychloride, as the solvent is called, dissolves rubber, glues, enamels, hydrocarbons, and many other substances which hitherto have been regarded as most resistant to all chemical agencies except fire.

"Such products as redmanol, hakelite, and condensite, which are used as substitutes for amber in the making of tobacco pipes and for many other industrial purposes and have been until now regarded as insoluble in all known solvents, are readily dissolved by selenium oxychloride, according to the announcement of Dr. Lenher. By its use ordinary paints, varnishes, and shellacs can be removed from furniture and carriages and other objects without injuring the wood, and enamels can be taken from automobiles completely without affecting the steel body.

"Its dissolvent powers are so vigorous," says Dr. Lenher, "that it will remove the bitumen from soft coal, but will not attack the pure carbon of anthracite. The cocoanut charcoal in the gas-mask," continued Dr. Lenher, "can be activated by this new reagent by treatment at ordinary temperatures, which is a considerable advance over the older steam activation at a white heat."

"The use of activated charcoal in extraction of gasoline from natural gas is one which is interesting chemists today, as it will tend to increase the supply of fuel for motor vehicles, and still leave the gas available for household and industrial purposes."

—Literary Digest.

China has a permanent air-mail service between Peking and Tien-Tsin.

Oil Development Work In Sanpete County Field

Much publicity has been given the San Rafael Swell, Circle Cliffs and Huntington oil fields of Utah during the past several months, where practically every acre has been leased or filed upon and where considerable development work now is being done, with Huntington as the favorite locality at the moment. But the Sanpete county field, in which geological conditions are recognized as at least the equal of any, has remained in the shadows of the spotlight of public attention, according to reports emanating from those interested in the field.

Thirty-two miles directly west of Huntington over a road built by the government, is Ephraim, the center of the Sanpete county oil field. Oil discoveries were made in Sanpete county many years ago, but little or no interest was taken as oil had small commercial value at that time. One well drilled on what has been termed the Ephraim dome, struck oil at 540 feet, with an estimated flow of better than ten barrels a day. However, the owner of the land was seeking water, not oil, and he drilled the well to a greater depth, where water was encountered. This water has always contained so much oil and gas that neither sheep or cattle would drink it. The gas absorbed by the water in this well will readily ignite.

The Ephraim dome structure has a north-south trend, starting about two miles south of Ephraim and extending north to Spring City, a distance of about fifteen miles, and consisting of a series of foothills separated from the Wasatch plateau by a valley from one-half to a mile wide. Practically all of

this land is patented and has been leased for drilling purposes by numerous companies and individuals.

The Utah Central Oil Company has 3,000 acres in this field and started drilling in January. The formation has been very hard and slow progress has been the result. However, this well is down over 300 feet and encountered a showing of oil at 151 feet. At between 200 and 300 feet, three feet of oil sand was penetrated by the drill and made a very good showing. It is understood that a third oil showing has also been had in this well. Drilling operations stopped on April 18th, awaiting casing which has already been shipped from California. As soon as the water is cased off, this well will be drilled to a depth of 540 feet, when it is estimated they will strike the pay sand found in the old well. A second well has been located and drilling will start this month.

The General Oil Company, a Utah corporation controlled by California capital, owns a large acreage in this field, while the Producers' Oil Company, another Utah corporation, has taken over 16,000 acres of leases on patented ground and active operations, it is promised, will begin early in May. The United Utah Oil Company also has large holdings in this field.

The Sanpete oil field has many advantages on account of its location and production in this field, it is claimed, would be more valuable than at many other points where drilling now is going on vigorously.

fornia, one of the largest western oil companies.

This combination gives the company a crew of drillers who have brought in production from all the various oil bearing formations. The Texas man has drilled Pennsylvania strata and the California man has drilled formations above and including Cretaceous.

Mr. Powers said the company's geologists estimate the depth of the Aspen oil sands, which is the sand to be drilled for, at 2,000 to 2,500 feet. The Aspen is an oil measure of Cretaceous formation.

Montana and California Ground in Proven Fields.

The Cat Creek option held by the company is for a block of ground immediately adjoining producing leases and is in the heart of that Montana field. The California land which is under option to the company is immediately adjoining producing ground owned by E. L. Doheney, one of the largest oil operators in the country, according to Mr. Powers, who said both of these options are for ground that is regarded as sure shot for production.

The company is also preparing to drill in southern Utah fields, Mr. Powers said. Leases have been secured in all of the fields in the south end of the state and should any of the tests now under way there bring in production the Western Empire Company would immediately drill its ground in the producing field.

The Western Empire Petroleum Company is capitalized for \$500,000, divided into \$1 shares. Incorporators of the company are Roger W. Powers, J. W. McKinney, Franklin Riter, W. J. Cowan and William D. Bailey.

GREAT BEND ON PAYING BASIS.

Goldfield, Nevada, April 25.—The Great Bend continues to develop an ore body that promises to open into the biggest body of shipping ore ever found in this locality. The drift from the 308 upraise has been advanced at this writing fifteen feet and carries high values. It is expected at this point to cut into the downward extension of the rich ore shoot. Should this occur then Great Bend will be in the shipping class for some time. Active preparations are now under way to begin shipments. Recently a lease was let and the leasers have cut a six-inch streak right at the surface.

Altogether Great Bend today looks more like making into a real mine than ever before in its history. While the ore in places runs very high, it will be graded down for shipment to come within the \$50 a ton rate for milling and freight charges. While very high assays have been had two and a half feet show assays of \$132 and \$201, and nine cars show \$57.60. All of this will be graded down for shipment. Great Bend now seems to be on a paying basis.

Oil Test Well Drilling To Begin at Coalville

Standard rig drilling equipment to be used in boring a deep test well for oil at Coalville is being loaded at Fort Worth, Texas, for immediate shipment and operations will be underway as quickly as possible, according to Roger W. Powers of the R. W. Powers interests who will drill the well for the Western Empire Petroleum Corporation.

The Western Empire company was recently incorporated here and holds 15,000 acres of patented and government land leases in Utah and Wyoming and also has options on what is regarded as proved oil land in the Cat Creek field in Montana and in California. Mr. Powers said the company is fully financed to drill the Coalville test.

Under an arrangement already made the R. W. Powers interests gives the company the use of an experienced field crew. Yardage and trackage for the company's use has been secured at Coalville and location of the test well will be decided on before the rig reaches the field. Heavy standard equipment will be used and plans have been made for a 3,500 foot test.

Expert Drillers Employed.

The drilling crew includes a driller who has had twenty years of experience in Texas, who is coming from the Powers organization at Fort Worth and another from California, who has had many years experience in California and Wyoming. The California driller is now employed by the Union Oil of Cali-

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*Illustrated.

The DeBeque New Era, of DeBeque, Colorado, has changed its name to DeBeque Shale and Oil. Sounds awkward, but maybe it will work out all right. The paper has been purchased by E. Bernard Jones, of Denver. L. G. Schwallenberg is still its editor.

ATTITUDE OF MAN TOWARD HIS JOB.

Rebirth of normal business awaits a new attitude of man toward his job, James S. Alexander, president of the National Bank of Commerce in New York, said in an address before the semi-annual meeting of the National Association of Cotton Manufacturers of Boston, Mass., on the 22d. Correction of the business and social confusion of the times must be sought, he urged, not only in technical banking and business adjustments, but more particularly in the human element, which has set free great forces that must be brought under control before business can again be on a sound basis.

"Never before in the history of the world has there been such a universal and profound change in human conduct as we have seen in the period since the world war began," Mr. Alexander declared. "Never before has human conduct produced such variations in business away from what we are accustomed to consider a normal course.

"It is a question of the personal attitude of man toward his job. Looking at this in a large way we see nations still struggling and fighting one with another. Within nations we see labor still creating turmoil, while the attitude of employers is not always what it should be. Business stability and a new normal for the conduct of the world's economic life cannot be found while these conditions persist.

"Too many people today hope and expect something will be done for them, although their interests would best be served by their doing a full day's work for their pay. There is an effort on the part of workers to retain the advantages won during the abnormal war period of shorter hours, higher pay and easy work, regardless of the present lack of an economic basis for the continuance of such conditions. The fundamental principle of enlightened labor leadership today should be to inculcate a return to the doctrine of an honest day's work for an honest day's pay. Inflated wages and the non-competitive conditions of the war and the later boom period produced inefficiency and irresponsibility.

"It is essential to the welfare of labor itself to banish this attitude, not because individual efficiency and a full return of value received in the pay envelope mean bigger profits for the employer, but because they mean better times for the workers themselves. Workers cannot, in the long run, consume more than they produce. If wages are too high in relation to the exchange value of the product, wages must come down, for no wage can be permanently maintained at a point above what it is worth measured in terms of other products.

"A return of social stability rests upon recognition by both nations and individuals that reconstruction can come only by hard work, that business can endure only on the

basis of a sincere discharge of obligations, whether they be in the form of executive duties or in the form of day's labor, and that a high sense of personal responsibility must prevail in all the relations of life.

"The most frequently asked question of the day is when we may expect a return of normal business. Forecasts based only on technical business considerations are worth little. The rebirth of normal business awaits a new attitude of man toward his job."

SEEKING A ZINC MARKET.

Surveys of conditions in the zinc markets of the world are to be undertaken by the Department of Commerce, Secretary Hoover announced a few days ago, according to the dispatches. The situation in the industry in this country, where there is at present a 70 per cent shut down, is "pretty bad," the secretary said. He said he did not know what could be done to help the situation, but it was hoped the surveys would disclose where American zinc could be most profitably exported.

The eleventh annual report of the Mason Valley Mines Company was mailed out from New York a few days ago. It is brief and to the point. President Wilber Judson wastes only about 200 words, while General Manager A. J. McNab covers the company's activities for 1920 in about 500 words. He says: "There was no production during the year. * * * No further work is recommended at this property (the Gray Eagle group) for the present. * * * Nothing was done with the (smelting) plant during the year, except some necessary repairs of a minor character." At the end of the year the company had a surplus balance of \$830,354. Like many other large operating concerns the company is ready to move again when the copper market revives and the railroad companies are persuaded or compelled to make freight rates what they should be.

News coming from the new camp of Silverhorn, twenty miles north of Pioche, Nevada, makes it appear as though some genuine, worth-while discoveries were being made there. The district years ago was known as Horn Silver. Let us hope that the reversal of this appellation, backed by the faith, nerve and cash of the present "army of invasion," will demonstrate the district's real worth. It has always been well thought of and probably it is getting started right this time.

The town of Tyrone, New Mexico, is built away from the mines and mill, and large trucks, built like street cars, carry the men to and from their work at no cost to them. Regular trips are run connecting with all shifts.

Silver King Mill Building Contracted

Contract for the construction of the steel mill building of the Silver King Coalition Mines Company at Park City was awarded on the 20th by the board of directors to the firm of James J. Burke & Co., of Salt Lake. Erection of the steel building, costing between \$45,000 and \$50,000, is to begin, according to the agreement, as soon as the material arrives from the east, probably within forty days.

It is estimated that not more than forty days will be necessary for the erection of the mill building after material arrives. The structure should be completed by the middle of July or the first of August. If no unforeseen delays arise, directors of the company are of the opinion that the mill should be ready for operation by the first of November or December.

Plans of the King Coalition Company call for the construction of a mill building which will have along the slope of the hill a length of 300 feet. The upper half of this building, for the housing of the crusher plant, will have a width of forty feet; the lower half a width of eighty feet. At the lower end of the mill a building to house the boiler plant and concentrate dewatering equipment will be erected. This structure will have a floor area of 125 feet by eighteen feet.

Two ore bins will be built by the company at the upper end of the mill. The largest one, for the storing of coarse ore, will be 100 feet long, twenty feet wide and

twenty feet in height. Dimensions of the bin for the storage of the crushed ore will be forty feet in length, twenty feet in width and twenty feet in height. The combined capacity of these bins will be approximately 3,900 or 4,000 tons.

In the interval during which the mill building is being constructed, the company, according to Managing Director W. Mont Ferry, will have an excellent opportunity to investigate the merits of a large amount of first class, slightly used mill equipment, which is available. There will be some equipment, including motors, shafting, pulleys and other machinery, which can be salvaged from the old mill for use in the new plant. By buying with discretion the cost of the new plant, it is believed, can be reduced to a considerable extent in comparison with the cost of erecting a similar mill a year or so ago when prices were at their peak.

As the foundations of the old mill were uninjured by the fire, but little construction of masonry for the new plant will be necessary, according to officials of the company. The flow sheet which has been prepared for the mill provides for the treatment of ore with jigs, tables and flotation. Undersize material from the jigs and crushers and jig tailings will pass through rolls and be concentrated on tables. Tables tailings are to be crushed in ball or roller mills for the flotation cells. Ore bins will be partitioned for oxidized and sulphide ores.

on the 825-foot horizon is entered. Moreover, since all of the work previously done by the Prince Consolidated Company has been done east of the deep shaft on the other side of the Great Western fault, and as operations carried on at present are in territory to the west of the fault in virgin ground, possibilities probably exist, it is said, that have not been thought of.

The fissure veins that traverse the Prince formation have a northwest-southeast strike, with a slight dip to the east. In width they vary from a few inches to six and fourteen feet in some sections near the bed.

Before the completion of the railroad to the Prince property all of the mining was confined to these veins, shipments of ore from which assayed as follows per ton: First class ore, 149.7 ounces of silver, 39.45 per cent lead and \$4.20 in gold; second class, 48.85 ounces of silver, \$3.48 gold and 18.5 per cent lead.

As the veins are said to be identical to those in the old Pioche district on the north side of the hill, the management thought that exploration of the quartzite underlying the limestone would pay.

Before sinking through the limestone diamond drilling was done and two beds of ore discovered at depth of 825 feet and 1,085 feet, respectively. It is in the quartzite, on the contact of which the second bed was found, that the company expects to find the richest mineralization, from the fact that in the older mines of the Pioche district the great bonanza ore deposits were all found in this formation in the fissure veins.

MINE OFFICIALS CELEBRATE LEGAL VICTORY.

Directors, officials and attorneys of the Silver King Coalition Mines Company celebrated their recent legal victory over the Conkling Mining Company with a dinner at the Alta club two weeks ago, at which Director Moylan C. Fox was host.

Several years ago when the legal battle between the two companies over approximately a million dollars worth of ore was at its warmest those who attended the party while discussing fitting ways to celebrate a victory were told by Mr. Fox that he would give them the best dinner the Alta club could furnish if the suit was won. The final decision of the United States supreme court, which disposed of all questions involved in the suit, was no sooner handed down than Mr. Fox was reminded of his promise.

Invitations to the dinner were sent by Mr. Fox to the following: W. S. McCornick, W. Mont Ferry, W. J. Halloran, James Ivers, Thomas F. Kearns, David Keith, F. J. Westcott, Henry Newell, comprising the company's board of directors; M. J. Dailey, mine manager, and J. F. Fitzpatrick, officials of the company, and Thomas Marionaux and A. C. Ellis, Jr., legal counsel.

Prince Consolidated Shaft Strikes Ore Ahead of Time

Confirmation of the report that the Prince Consolidated Mining & Smelting Company's main working shaft had entered a mineralized formation at a depth of approximately 700 feet, was received a week ago by A. H. Godbe, president, in a telegram from M. C. Godbe, manager, who was at the mine. Manager Godbe's telegram stated the strike had indications of being important, and that the bottom of the three-compartment shaft was in ore shot through with galena. This development was hardly expected at the present depth of the shaft, for the first of the beds discovered by diamond drilling operations some time ago lies at the 825-foot level.

This bed, called the "silver bed," was thirty-four feet thick, it is said. Owing to the force of the water used in diamond drilling, no core was obtained except for the last eleven feet of this bed. Although the rich ore was washed away from the core

and only the coarse or low-grade material left, average assays of the mineral from this bed showed 25 ounces of silver and \$3.60 gold per ton.

When the No. 4 diamond drill hole was put down, at approximately the 700-foot horizon, a bed of iron ore was pierced. As assays of the core failed to show commercial values, this development was disregarded at the time. Since drill hole No. 4 was put down a distance of 125 feet north of the shaft, Mr. Godbe feels that it may be entirely possible that at the point the work is being done now the mineralizing solutions may have been strong enough to enrich the formation more thoroughly.

Another possibility, according to officials of the company, must be taken into consideration, and that is, if the shaft has entered an east-west fissure extending off from the Great Western fault, important mineralization may be reached before the "silver bed"

New Oil Shale Plant Demonstration is Success

By CAPT. JAS. R. SMITH*

The Denver contingent returned on yesterday's Rio Grande express from De Beque, Garfield county, with very favorable reports of the demonstration made Tuesday last, by the Ginnet retort process at the property of the Monarch Shale Oil Company, on Conn Creek, some thirteen miles north of De Beque, which is the hub or center of an extensive petroleum territory. About 100 prominent citizens from Grand Junction, Grand Valley, and other points in Mesa and Montrose counties, and also a delegation representing Denver and Rio Grande railroad interests, attended the demonstration, which was conducted by J. H. Ginnet, inventor of the process, with the assistance of A. M. Kivari, engineer of the Monarch company.

Turning Out Product in Quantity.

After an expenditure of \$35,000 in developing the possibilities of the 500 acres owned by the Monarch Shale Oil Company and a further cost of \$83,500 for a single unit of the Ginnet process, a production of from sixty to seventy barrels of shale oil each twenty-four hours was measured up in spite of the fact that the plant is not yet complete in its various details, such as an improved conveyor for the crushed shale and a method for pre-heating the prepared material. When the latter is installed it is predicted that the daily output from this single unit will reach 100 barrels of oil per day.

Three additional Ginnet retorts have been contracted for, and when these are in commission the company expects to ship an average of 400 barrels daily, and possibly in excess of that figure, to the Apex refinery in Boulder City, where the chief product will be an oil especially adapted to the flotation process for the treatment of precious metal ores.

Crude Oil Ideal for Flotation.

From tests already made at Kokomo and at points in the San Juan region and in Salt Lake, it is concluded that oil from Colorado shales is far superior to all other oils in connection with the flotation method. This assures a ready market for the Monarch oil at from \$18 to \$25 per barrel.

The cost of producing a barrel of crude oil at the plant near Debeque is estimated at \$1.85, of which 65 cents is charged against mining the shale, 40 cents to crushing and retort, 40 cents to transportation and 40 cents to taxes and small overhead charges of an incidental nature.

The grinding of the shale is done at

the face of the eight-foot seam—about 2,100 feet from the roadway—the material being dropped to the retort through a four-inch pipe. As the capacity of the plant is increased and as various details are improved, it is expected to lessen the net cost per barrel of the oil. A "commodity" rate over the Denver & Rio Grande from De Beque to Boulder city already has been arranged.

Tank Cars Promised.

Within forty days at the utmost tank-car shipments of shale oil will be a regular fixture for Denver & Rio Grande freight trains, thus giving an economical and commercial standing to a new and important Colorado resource—the reserve held in view by the United States navy department against the time when oil from wells becomes more expensive than at present because of natural depletion.

The present naval reserve of oil shale territory between Grand Valley and De Beque measures 40,000 acres. Recent sales of such lands in this neighborhood to New York and other outside capitalists have been closed at \$45 per acre. Four years ago the average price was \$2.50 to \$5 per acre.

As a result of Tuesday's demonstration, some fifty of the Ginnet retorts, manufactured in this city, have been ordered for installation in the De Beque, Grand Valley and neighboring shale oil districts.

NEW SILVER MINE

ADJOINING THE VIPONT.

According to a dispatch from Oakley, Idaho, on the 23d, a splendid body of ore has been opened in the Idaho-Utah silver mine at Vipont in northern Utah and twenty miles south of Oakley. The Idaho-Utah adjoins the big Vipont Silver mine on the east and the present showing indicates that the big Vipont will be duplicated according to F. J. Lake, superintendent of the Idaho-Utah.

Samples of the ore displayed in Oakley by Mr. Lake assay 34 ounces of silver and \$2 gold a ton. Other assays have run from 21 to 31 ounces of silver. The property is being opened by a tunnel and the ore was found 450 feet from the portal. The ore body has been raised on for twenty-five feet and a drift has been run along the hanging wall for forty-five feet, which is all in ore. The tunnel is in the ore twenty-four feet and the foot wall has not been reached. The ore has been continuous in the tunnel for the full fourteen feet and values have increased as the tunnel has been extended.

The ore body is 1,000 feet lower than the Vipont Silver mines ore and is only 300 feet away from the Vipont workings. Values are higher in the Idaho-Utah ore than they are in the Vipont. The Vipont property was worked intermittently for thirty years and had produced a large tonnage of ore before R. H. Channing acquired it a couple of years ago for the Lewisohn interests of New York.

When the new owners took over the Vipont they blocked out a sufficient tonnage of ore to warrant mill construction and then erected a flotation plant of 300 tons capacity. Concentrates have been shipped steadily since the mill was placed in operation.

Recently an electric power line was built to the property at a cost of \$40,000 and the mill electrified. The power line is being extended a few hundred feet further to the mine workings to furnish power for the machinery.

Control of the Idaho-Utah company is owned by local and Salt Lake people who have financed development since prospecting was started.

KENNEBEC TO RESUME OPERATIONS.

For more than a week past W. J. Craig, manager for the leasing company which suspended operations at the property when winter weather set in last fall, and when it was impossible to keep men on the job, has been waiting for the weather to settle in order that work might be resumed at the Kennebec mine, adjoining the Cardiff, in the Cottonwoods district, near Alta.

Supplies are in at the mine and a contract will be given to extend the tunnel workings to a point that will open up the mine directly under the early day workings, where a great deal of ore now is ready for extraction and shipment. The distance to be driven, Mr. Craig says, is not far, and after work starts it should be only a matter of a few weeks until production can begin, while the tunnel level horizon is just right for further exploration of fissures and beddings to the east.

There are now any number of good miners available for the work and it is expected that the property will demonstrate its real value during the present season.

It takes six switch backs for the dinky engines to get from their regular place of work to the round house at Morenci, Arizona, one of the copper camps of the Phelps Dodge Corporation. Hillsides had no terrors for the engineers who laid out the Morenci railroad system.

The Cristobal coaling plant at the north end of the Panama canal is the largest in the world for bunkering ships.

Predicts Utah Will Become Great Steel Works Center

In an address before the Utah Society of Engineers at the Salt Lake Commercial club on the 20th, Morris Rosenblatt, general manager of the Utah Steel Corporation's plant at Midvale, predicted that Utah would ultimately become a steel manufacturing center equal in importance to some of the largest in the country. He said that geologists and metallurgists were conducting investigations of iron ore deposits in southern Utah, under the direction of the corporation, and that initial reports were of a nature to lend the greatest encouragement to further exploitation.

Should the iron deposits of Iron and Carbon counties prove to be of sufficient extent and of required quality, Mr. Rosenblatt intimated that the business of his company would be very greatly expanded, owing to the peculiar advantages which it enjoyed in contrast to the steel mills of Colorado and other states, which were compelled to obtain their materials from distant regions. Short hauls and lower freight costs, he said, were among the important favorable factors which would redound to the benefit of steel manufacture in this section.

Mr. Rosenblatt said that the Utah Steel Corporation is now producing 200 tons a day of finished product, and that it is making preparations for an immediately larger production, which will include steel rails of the lighter weights. Until the present time, the corporation has been engaged in the manufacture of standard steel bars and rods. For the disposal of these products, the company has an extensive field, which includes not only western states but Japan, China and other foreign countries, which since the company began operations have been constant patrons.

Initial steel production of the company began in 1917, though prior to that time much wrought iron had been produced. In the year mentioned, an open-hearth steel furnace was placed in operation, and since that time has continued steadily, scrap material collected throughout the intermountain region being utilized.

Crude oil as a fuel has been introduced of late instead of coal, the speaker said, and the results are so eminently satisfactory that the corporation is fervently wishing for the success of Utah oil prospectors, as a native oil source. Another difficulty which for a time confronted the company was that of obtaining desirable coke. This has been overcome by mixing the highly volatile coal of Utah with a coal of low volatile properties, the result of which has been a metallurgical coke of the required quality.

The corporation, Mr. Rosenblatt said, at

present employs from 350 to 450 men. In 1920 the payroll amounted to \$750,000 and in the same year the company produced steel to the value of \$3,000,000, it is anticipated that the output this year will be more valuable, because of the plans to manufacture steel rails, pig iron, steel pipes and sheet iron in addition to steel bars and rods.

In conjunction with the address of Mr. Rosenblatt, three reels of moving pictures showing details of the iron industry were exhibited. A large number of members of the society from many parts of the state were in attendance, and before the meeting closed tentative arrangements were made for the membership and other engineers of the state to visit the Midvale steel plant within the next few weeks, where they will study the process of steel making.

CATLIN OIL SHALE PLANT TO DOUBLE ITS CAPACITY

Manager Sheeler of the Catlin oil shale plant has announced that another unit will be built immediately at the plant and that they are now awaiting the arrival of material and machinery, says the Elko, Nevada, Free Press. This has been delayed on the road in shipment and as soon as it arrives the work of installing it will be rushed to an early completion. The company has completed their extensive experiments, extending over several years, and have finally succeeded in finding a successful process for handling their shale.

The capacity of the present unit is 100 tons daily, and with the completion of the second unit their output will be doubled. This will be good news to the people of Elko and to the state at large, as it means that the oil shale industry will now go forward and will make Elko the metropolis of the state.

PIOCHE SHIPPERS GET REDUCTION.

The mines of the Pioche district of Nevada, which like the properties of the Tintic district, have suffered on account of the high railroad charges, have just been granted some relief. A notice has been issued announcing a reduction in freight rates on Pioche ore, effective on May 20th. The Pioche Commercial club gave the mining operators some assistance in the fight for lower rates. Reductions have been announced as follows: \$10 to \$15 ore, present rate \$4.25, new rate \$3.75; \$15 to \$20 ore, present rate \$5.50, new rate \$4.50; \$20 to \$25 ore, present rate \$7, new rate \$5.50; \$25 to \$30 ore, present rate \$7, new rate \$6.—Pioche Record.

SUGGESTS "SHALE ASSAY TON" FOR OIL-SHALE TESTING

Ed. Mining Review: One objectionable feature in the assay of oil-shale is the interpretation of results. The oil distilled is usually measured in cubic centimeters, and the conversion to "gallons per ton" involves just enough figuring to make it a nuisance.

To eliminate the need for conversion, I have adopted for the weighing of the shale charge a unit of 239.66 grams derived from the equation:

$$\frac{\text{Gallons} \times \text{Cubic Centimeters}}{\text{ton}} = \frac{\text{X grams}}{\text{X works out at 239.66 approx.}}$$

I call this unit a "Shale Assay Ton."

If the charge consists of one "Shale Assay Ton," then the cubic centimeters of oil distilled represent "gallons per ton" directly.

If the charge consist of a multiple or fraction of the "shale assay ton," then the "gallon per ton" are found by simply multiplying the cubic centimeters by the reciprocal of the multiple or fraction used in the charge.

I had assumed that other shale assayers were using the scheme, but so far I have seen no mention of it.

I see no valid reason why we should not adopt a "shale assay ton." Its adoption in shale assaying would be as reasonable as is that of the ordinary assay-ton in ore assaying.

The makers of weights could facilitate the adoption by putting on the market sets of weights consisting of convenient multiples and fractions of the unit "shale assay ton."

If the matter has not yet received attention I tender the suggestion in all modesty. Perhaps some of the more confirmed "shale hounds" will favor us with their criticism on the idea.

ROBERT B. GEMMELL.

Gold Hill, Utah, April 18, 1921.

SPRING COATING FOR THE BIG "U."

"U" day will be celebrated at the University of Utah May 2. It is a tradition of the school that one day in the late spring be set aside for the whitewashing of the big letter on the hill above the campus. Underclassmen assemble at the rostrum in working clothes early on "U" day for roll-call; every man must be present. Luncheon is served by the co-eds and the afternoon is given to a matinee dance and athletic competitions. The day is ended with a dance, usually at Saltair. The "U." was put on the hill by the students in 1907. It is 101 feet long and 101 feet wide at the widest part. It is on the hillside about a mile northeast of the campus.

Con. Spanish Belt Mine Soon Will Be Producing

The Consolidated Spanish Belt Silver Mining Company, operating the old Barcelona mine in Spanish Belt mining district, fifty miles north of Tonopah, Nevada, is rapidly getting ready for production. During the past four years development has been carried on continuously, during which time some 8,500 feet of underground work has been performed. This work consisted of the driving of a long adit drainage tunnel which solved the water problem and drifting for thousands of feet on the large veins exposed in the property. The San Pedro shaft, located 2,600 feet away from the mouth of the tunnel, has been sunk to a total depth of 525 feet, and connects up with the lower tunnel workings, thus giving the mine perfect ventilation.

Several tributary veins have been cut, exposing quite a tonnage of milling ore, but the main Barcelona vein promises to yield the largest milling production tonnage in the mine. Approximately 70,000 tons of milling ore have been developed as probable ore which will average between \$20 and \$30 a ton. A number of streaks of high grade ore, varying in width from a few inches to several feet, assaying from \$50 to \$2,000, have also been cut. At the present time on the 145-foot level in the San Pedro section of the mine, an eight-inch stringer of high grade ore assaying about \$200 a ton has been followed for some fifty feet. This stringer is widening out and gives promise of increasing values.

Fifty-Ton Mill Nearing Completion.

The company is now engaged in completing the erection of its first milling plant under the direction of Mr. Lou Townsend. This plant consists of ten 1,050-pound Union Iron Works' stamps, together with four concentration tables and an oil flotation unit, having a capacity of approximately fifty tons of ore in 24 hours.

It is expected that the heads will run around \$30 per ton and that the mill will concentrate from 20 to 30 tons of ore into one ton of concentrates. Ordinary concentration tests show that about 60 per cent of the values can be saved with water concentration and the balance by oil flotation. These tests ran as follows: Gold, \$1.60; silver, \$564; copper, 18.4 per cent; lead, 30 per cent, giving a gross value of \$626.40 per ton.

The mill is expected to be completed about June 1st at which date the mine will be electrified. The company has recently obtained a permit from the Federal Power Commission allowing them to connect up with the Nevada-California Power Company. The five mile high tension power line is now

completed and telephone connection has also been made with Manhattan and Tonopah.

The company operates a fleet of four-wheeled drive trucks which will handle the concentrates and supplies between Tonopah and Spanish Belt.

The company has been financed chiefly by Ohio capitalists and approximately \$300,000 has been spent to date in development and equipment during the past four years of operation. Spanish Belt already has a past production record of around \$500,000, when the mine was in operation some thirty-five years ago. Last year the company shipped out eighty-one tons of selected ore which yielded \$9,495.10 or at the rate of \$116.71 per ton. This was the highest value in ore shipped from any mine last year in Nye county.

E. J. Schrader is the superintendent in charge of operations.

FELLOWSHIPS IN METALLURGY, U. OF U.

Invitation is hereby extended to qualified men to make application for fellowships in the Department of Metallurgical Research, U. of U., during the year 1921-1922.

This department is maintained in connection with the Utah station of the United States Bureau of Mines. By agreement the work of this department is under the immediate supervision of metallurgists of the bureau, assigned to duty at this station.

During the coming year, 1921-1922, the problems to be continued are the following:

1. General ore dressing problems.
2. Special problems bearing on the flotation treatment of ores.
3. Volatilization process and its application to gold-silver ores.
4. Volatilization process and its application to lead ores.
5. Volatilization process and its application to copper ores.
6. Hydrometallurgy of zinc.
7. Oil shale investigations.

The opening here announced affords an excellent opportunity for qualified young men to become experts in the fields of mining and metallurgy and to prepare themselves for special highly technical work in these fields. Those who receive this training have been, and are, in great demand at remunerative salaries.

There are several fellowships to be awarded, each having an annual value of \$720. These fellowships are open to college graduates who have had a good train-

ing in chemistry and metallurgy and applications for them will be received up to May 15, 1921. Applicants should send a copy of their records from the registrar's office of the college where they have, or will be, graduated and the names and addresses of at least three references who know their character, ability and attainments.

Holders of these fellowships will be subject to the rules governing employees of the United States Bureau of Mines and will report for duty about July 1, 1921. They must also register as students in the University of Utah and become candidates for the degrees of Master of Science in Metallurgy (unless this or an equivalent degree has been previously earned). Their class work will be directed by the heads of the departments of instruction and their laboratory work by metallurgists of the Bureau of Mines. Fellows are appointed for one year, but the appointment may be renewed. Fellows have no laboratory fees to pay.

Address applications to Joseph F. Merrill, Director of the Utah State School of Mines and Engineering, Salt Lake City.

HALF-NICKEL COIN BADLY NEEDED.

Despise not the day of little things in this period of more or less compulsory thrift, says the New York Curb.

There is now a crying need for a two-and-a-half-cent piece, or a half-nickel coin, and it behooves every citizen to work for its creation.

Congress now has before it a proposal to reestablish the long obsolete two-cent piece. But a two-and-a-half-cent piece is needed far more than a two-cent piece.

With this idea in view, an amendment to the new subsidiary coinage act has been suggested of late which would do away with the anomaly of the government imposing numerous small taxes on the people, calling for the payment of a two-and-a-half-cent and at the same time failing to provide a coin with which to pay such a tax without loss to the taxpayer.

There seemingly is little sense from an economic viewpoint in the re-creation of a two-cent piece which would accomplish nothing.

On the other hand, the need for the creation of the two-and-a-half-cent piece is amply shown in the injustice of forcing the purchaser of many taxed small luxuries to put out the extra one-half cent which one of two bargaining parties must pay because of the government's lack of arithmetical method.

A mining shaft in Sombrerete, Mexico is almost exactly on the Tropic of Cancer, and at noon on June 21 the sun shines to the bottom lighting up the well to a vertical depth of 1,100 feet or more.

Radium Co. of Colorado

Absorbs Rare Metal Concerns

On the 11th inst. a merger was effected between the Carnotite Products Company (formerly the Tungsten Products Company of Boulder) and the Radium Company of Colorado, whose plants and offices are in Denver.

The new company will bear the name of the Radium Company of Colorado, because of the already well established trade relations of the Denver company in both the domestic and foreign radium markets.

The new company will have a capitalization of \$1,200,000 in preferred stock and 20,000 shares of common stock or no par value. Practically the entire issue of preferred stock has already been subscribed.

Bulkeley Wells of Denver is president of the new company.

Warren F. Bleecker of Boulder is vice-president.

H. Carey Morgan of New York City, K. L. Kithill of Denver, W. A. Schlesinger of Denver, L. C. Schultz of Boulder, A. H. Bunker of New York City, and R. W. Thorne of Denver.

Personnel of New Management.

The president of the new company, Mr. Bulkeley Wells of Denver, is one of the most prominent and widely known mining men of the west. Mr. Wells has been prominently identified with the development of practically all of the mineral resources of the west. Mr. Wells was formerly president of the American Mining Congress and in that capacity was able to further the interests of the mining industry in a great many important respects.

Warren F. Bleecker, former president of the Tungsten Products Company and the Carnotite Products Company of Boulder, is one of the most widely known metallurgists in the rare metal business. Mr. Bleecker, with a staff of trained metallurgists, will have charge of the development of the company's metallurgical processes for the extraction of the rare elements from their ores and their conversion into commercial forms. During the past ten years Mr. Bleecker has rendered service of inestimable value to his company and to the rare metal industry through his work on the chemical treatment and concentration of the values in the ores of rare metals.

H. Carey Morgan, former vice-president of the Tungsten Products Company of Boulder, is a prominent New York financier who has been associated with the rare metal industry for a number of years.

Mr. Schlesinger and Mr. Kithill were former president and vice-president of the Schlesinger Radium Company of Denver and

have been prominently identified with the radium industry since its inception in this country.

Mr. Schlesinger has been particularly identified with the development of radium therapy and will continue in this position in the new company.

Mr. Kithill, who has been for a number of years prominently identified with the development of carnotite mining, will have charge of the development of the mining properties of the new company.

Mr. L. C. Schultz, former assistant general manager of the Tungsten Products Company, will be the work manager and have charge of the operation of the chemical plants, electric smelters and concentrating plants of the new company.

New Company in Rare Metals Field.

By virtue of the combined property holdings and plants of the two companies, the new company will have as large a production of any company in the world.

In addition to the production of radium, the new company will manufacture ferroalloys of vanadium, uranium, tungsten and molybdenum, and through its research laboratories will be constantly working on the development of new rare metal products.

The plants in Boulder will be operated for a while under the present conditions as will the plants in Denver, and while there are certain advantages to be gained in operating the larger combination of plants in Boulder, there are other advantages equally important to be gained by operating in Denver. In determining this every factor will be carefully considered and a decision will finally be made by the board of directors.

GREAT ACTIVITY ON COMSTOCK LODGE

By Al H. Martin.

Apparently the great Comstock Lode region is on the verge of an old-time boom. New and strongly financed companies are busily acquiring holdings, and some of the largest operators in the country are concerned in reopening old mines and development of prospects at Virginia City, Gold Hill, Silver City, Mound House, and in the Brunswick canyon and North Carson sections.

The United Comstock Company, controlled by Bulkeley Wells and New York associates, has 200 men on the payroll and has driven its huge working-and-drainage tunnel 3,000 of its destined 9,000 feet. A spur track has been extended to the property from the Virginia & Truckee railroad, and preliminary work on the 1,000-ton mill is scheduled to start early in May.

The company reports upward of 2,000,000 tons of profitable ore blocked out in the Imperial mine with the reserves being constantly augmented by new developments. The tunnel is being driven with the aid of an electric locomotive and shoveling machine and is advancing from nine headings. It is designed to develop at considerable depth the ore-deposits of the Imperial, Knickerbocker, Alpha, Yellow Jacket and several other noted producers.

Other properties undergoing vigorous developments are the North-End and Middle Mines groups, embracing the Consolidated Virginia, Ophir, and other famous Virginia City properties, and the Comstock Extension, Comstock Florida, Comstock Reliance, Monte Cristo and Comstock Silver. Many of the old properties are being rejuvenated, while several prospects are rapidly graduating into the mine class.

MEXICAN MILL ON COMSTOCK ADOPTS NEW CRUSHING SCHEME

In a new scheme developed at the Mexican mill in this city, according to a statement made by Superintendent Alex Wise of the Northend mines, the ore is crushed in the battery in water instead of cyanide solution, with the ore sent to the classifiers, and the coarse material is delivered direct to the tube mills in closed circuit. The moisture in this ore is about one of water to three of ore and is brought up to a strength of two pounds of cyanide. The overflow discharge from the classifiers is run at present to a Callow cone and the overflow run to waste. The underflow is pumped direct to No. 1 agitator and unites with the ground material from the tube mills and the balance of the operation is as heretofore, namely, counter current decantation.

The object of this new process is to wash out the decayed wood and soluble sulphates and throw to waste about 5 to 10 per cent colloidal slimes. These slimes carry only a small assay value. It is expected that this method will increase the tonnage from 80 to at least 150 tons per day, and later a possible 200 tons every twenty-four hours, and will balance the cost against small loss contained in the values in the colloids.

The mill can be changed back within five minutes to the old system of grinding in cyanide solution in the batteries and this will be done on all high grade ores.

A bullion shipment was made from the Mexican mill this week to the San Francisco mint, having a gross value of \$5,500. There will be another clean-up and bullion shipment within the next few days.—Virginia Chronicle.

Don't worry when you stumble—remember, a worm is the only thing that can't fall down.

Around the State

Superintendent Fisher of the Naildriver informs the Park Record that the entire property is now being worked by leasers. Conditions, however, according to Mr. Fisher, are good and considerable ore is being mined.

H. G. Snyder, well known in Tintic on account of his connection with various East Tintic properties, was named as metal mine inspector for Utah on the 15th. The appointment was made by the industrial commission and not by the governor.

The United States Mining Company has more leasers at work in its properties at Bingham than has been the case for many years. This policy has resulted in the employment of a number of men who were thrown out of work by other mines closing down.

Reduction of 20 per cent in salaries of officials and employees paid on other than a daily basis was announced on the 15th by the Utah, Ray, Chino and Nevada Copper companies which recently suspended operations. The decrease becomes effective tomorrow.

At the annual meeting of Nevada Consolidated Copper Company the number of directors was increased from twelve to fourteen. Murray Guggenheim and C. V. Jenkins were added. At the annual meeting of Chino Copper and Ray Consolidated directors were re-elected.

The Utah Consolidated Mining Company are installing a new 500 horsepower Norberg hoist. The work will soon be completed and this mine will then have a hoist second to none in the state. The mine is not shipping at present. About seventy men are still employed.

Each foot of progress made in driving the Little May south drift on the 200-foot level results in the opening of more extensive mineralization, according to H. E. Giers, secretary of the Little May Mining Company. Mr. Giers, who has returned from a visit to the property in the South Tintic district, is highly gratified with the physical condition of the mine, especially the south drift on the 200-foot level.

Indications considered to be of an important nature have been encountered in the Tar Baby adit in the south fork of Big Cottonwood canyon. A letter from Charley Olson, in charge of operations at the mine, received by J. M. Matsen president and general manager, states that a small fracture which has been followed in a southeasterly direction, is proving to be a well mineralized fissure, with considerable galena showing.

General Manager M. J. Daily, Directors Thomas Kearns and David Keith of the Silver King Coalition Company, and Mr. Soup-

coff of the American Smelting Company, came up from Salt Lake and made a visit to the Park Utah. The gentlemen were much impressed with the splendid ore showings of that company, and predict a wonderful future for that end of this great mining district. The King Coalition owns considerable territory adjacent to the Park-Utah, which undoubtedly was the incentive for inspecting the property.—Park City Record.

Several of our mining operators have received a beautiful and comprehensive booklet issued by the Pittsburgh Silver Mining Company of New York. This was prepared with the object of interesting capital in the stock of the new corporation, but it is understood that one of the few first proofs caught the eye of a wealthy investor who purchased the entire capital issue and there is, therefore, no stock offered to the public. It is also stated that work on the mine will start as soon as the roads up the canyon will permit hauling supplies.—American Fork Citizen.

Information received from the Ophir Silver Mines property in the Ophir, Utah, district, is that the tunnel which is being extended to the main branch of the Buckhorn fissure, now has a full face of quartz, which is streaked with seams of ore, samples of which run above forty ounces of silver. The tunnel now is in forty feet beyond where the first vein of ore was cut, and from which were taken samples which assayed an average of about twenty ounces of silver. The seams, or small veins of ore, are said to be leading in the direction of the extensive mineralization disclosed as the result of a cloudburst early last summer.

Chief Consolidated Mining Company, operating at Tintic, has posted a regular quarterly dividend of 5 cents a share, payable May 1. The dividend totals \$44,000 and will bring total dividends paid by the company to \$1,959,920.87. Throughout 1920 the company paid quarterly dividends of 10 cents a share but found it necessary to reduce the Janaury dividend this year to 5 cents on account of the bad situation the mining industry was confronted with. The Chief is one of the nation's largest silver producers. Good silver content of its ores and its splendid mining organization has enabled the company to maintain profitable operations.

Report of the Utah Consolidated Mining Company for the year ended December 31, 1920, shows net loss of \$196,140, compared with profit of \$181,965 in the preceding year. Excess of current assets over current liabilities amounts to \$1,242,672, consisting of copper, supplies, 8,250 shares of Anaconda Copper Mining Company stock carried at \$500,000, and Liberty bonds. The reports states "the mining suits that were tried last fall were decided against us in the district court. The suits will be appealed to the circuit court of appeals." Production

last year amounted to 3,187,492 pounds of copper, 9,999,350 pounds of lead, 273,730 ounces of silver and 4,697 ounces of gold.

Good progress is being made in driving the main tunnel of the Big Cottonwood Coalition Mines Company, according to C. E. Robertson, secretary-treasurer. Operations have been maintained as steadily as possible during the past winter. Since the contractors returned to the mine a short time ago they have been sending the face ahead at the rate of 100 feet a month. The face is approximately 3,259 feet from the portal and the company's engineer estimates the Copper King fissure, one of the main fissures the tunnel will open, to be about 300 feet ahead. When the Copper King fissure is reached a drift will be sent out in it to its intersection with the Prince of Wales fissure.

NEW BLUE SKY REGULATIONS.

Stock exchanges in Utah may now be regulated by the state securities commission. Governor Charles R. Mabey having signed the bill passed by the fourteenth legislature, which provides as follows:

"No organization of one or more individuals shall organize or conduct a public stock exchange for the purpose of buying or selling stocks and bonds with or without the payment of commission or brokerage, without first obtaining the sanction of the commission, and the commission shall have full power to impose such conditions and regulations for the operation as they may see fit. Violations of this law renders the individual or individuals operating such exchange without the authority of the commission liable to a fine of \$100 for each and every day that it is operated without a license."

Other changes made in the "blue sky" law exempt mutual building and loan associations from the operation of the law when there is no preference in the division of profits of such companies; place any "copartnership, trust, joint stock association or common law company" within the explicit wording of the act, thus dealing with an oil promotion situation that proved considerable of a problem to the former commission; increases maximum filing fee (which is one-tenth of 1 per cent of the stock to be sold) from \$50 to \$200, and increases the dealers' filing fee from \$10 to \$25. It is provided that agents' licenses shall run for one year, instead of all expiring May 1, as under the present law.

Dawson New Mexico, the coal mining camp of the Phelps Dodge Corporation, claims the distinction of having the highest golf course in the United States, with the altitude of the putting green of the first hole at 6,774 feet. Some of the course is higher than that.

In Nearby States

ARIZONA.

Completion of the sinking contract of the Junction shaft to a depth of 2,385 feet, gives the Calumet and Arizona Mining Company the deepest working shaft in the Warren district.

The old Silver King mine, Arizona's oldest silver producer, which has paid millions in dividends, has seen its finish. Creditors have received an order for its sale, the claims aggregating \$361,000.

Among the prominent men visiting Mohave county the past week, was William P. Steele, vice-president of the Foundation Company. Mr. Steele while here went through the Katherine mine and was more than enthusiastic in praise of the Katherine section.—Kingman Miner.

Word received from A. C. Werden at Goldroad is to the effect that the vein on the Gold Ore has been cut by the crosscut on the 700 and shows a width of nine and a half feet. Assay returns were not available, but pannings show a value of \$15 to \$20 in gold and \$20 to \$40 in silver.

A special stockholders' meeting of Jerome Verde Copper Company will be held in Phoenix May 5 to ratify sale of the property for \$420,000 to Jerome Verde Development Company, a new corporation to be organized with an authorized capital of 1,500,000 shares of 50 cents par value; exchange of one share of stock of the new company for ten shares of Jerome Verde Copper, and the delivery of an option to purchase 628,078 shares of Jerome Development Company stock for \$464,039 by United Verde Extension Mining Company, which will develop and operate the property.

Now that new electrical machinery has been installed at the Kay mine near Canyon, a plan of development work to cover several years has been inaugurated under the direction of P. L. Woodmen, superintendent, and John P. Ross, mining engineer and geologist. No attempt at ore production is being made by the company at present, the full force of thirty men being employed on the development project. A new vertical shaft is being sunk and has now reached a depth of about 280 feet. It will be finished at about 800 feet. The Kay mine is the property of the Kay Copper Mining Company.

BRITISH COLUMBIA.

Total shipments for the quarter, with names of the mines and their locations, were: Company mines, 99,970 tons; Gold Hill, Tagun, B. C., 3 tons; Millie Mack, 12 tons; Velvet, 63 tons; Bell, 16; Horn Silver, 280; Sutherland & Thompson, 15 tons; Black Prince, 57; Blue Bell, 977; Gem, 11;

L. T. Mine, 11; Nip and Tuck, 5; Leasers, Ainsworth, 112; Ruth, 21; North Star, 111; Paradise, 213 tons.

Total receipts at the Trail smelter in the first three months of the year were 101,898 tons, compared with 73,236 tons in the first three months of last year, an increase of 35 per cent. Of the total receipts this year 99,970 tons were from the mines owned by Trail smelter owners, the Consolidated Mining and Smelter Company of Canada.

CALIFORNIA.

The recent cave-in at the El Dorado Lime and Mineral Company quarries in Eldorado county was caused by the sink of an old shaft above a new one. It occurred when the force of workmen were absent, so there were no casualties.

The new gold quartz mine which is being opened on the Mulcahy ranch on Deer Creek, near Grass Valley, under the management of L. M. Dull, is reported to be paying its way, good returns coming from the small mill that has been installed.

COLORADO.

A contract for 100 feet of tunnel work on the Neptune claim of the Osborne group, on Fall river, has been awarded local miners by E. C. Condit, of Silverton, who recently took over the property.

Bert Humphrey has been appointed manager of the Whitecloud and Paymaster mines, and will go to Denver in a few days to discuss plans for resuming operations of the mines. These properties were temporarily closed when the former manager, Fred Jacob, was killed some weeks ago.—Ouray Herald.

The management and faculty of the School of Mines at Golden were exonerated and sustained by a special legislative committee which investigated the conditions of the school, following charges of mismanagement on the part of President Alderson. The report said the citizens of Colorado should give the school a hearty support.

IDAHO.

The Bullion Mining Company, in the Coeur d'Alenes, will resume operations as soon as weather permits.

Undismayed by costs of mining or the price of metals, the Callahan Zinc-Lead Company of the Coeur d'Alenes has started a shaft to reach an additional 200 feet of depth.

According to surveys, allowing for the dip and strike of the ore, the ore body should be cut within the next 100 feet, officers of the North Bunker Hill Mining Company declare in a letter received by stockholders recently. The property is in the

Kellogg section of the Coeur d'Alene district.

With the wage scale reduced somewhat and many idle miners eager to secure and retain jobs, the mine managers of the Coeur d'Alenes claim that they are able to get at least 40 per cent more work for the same money required a few months ago.

One of the largest strikes in the Pine creek district was made recently on the Sydney group, adjoining the Nabob property, seven miles southeast of Kellogg, according to L. M. Gay, director. The ore exposed carries good values in lead and zinc and a small silver content.

Wage reductions affecting approximately 2,000 employees of mines and smelters in the Coeur d'Alene mining district of northern Idaho has been announced. They amount to 50 cents a day for mine employees and 75 cents for smelter men. The reductions which become effective May 1, will make the wages of miners \$3.75 to \$4.75 a day and those of smeltermen \$3.50 to \$5.25.

During the week ending April 15, the Bunker Hill and Sullivan smelter has shipped 75,000 ounces of silver to the United States mint at Denver. This is the second large shipment of silver during the last two weeks. The smelter is operating one furnace and handling 100 tons of ore a day, this ore coming from the Hecla, Caledonia, Bunker Hill and Sullivan and a few leasers on Big Creek.

The New Caledonia Mining Company is pushing development work as rapidly as possible, with a crew of six men working two eight-hour shifts. At present the work is confined to cross-cutting the vein recently struck at a depth of 450 feet, which carried values in silver and lead. The vein was entered from the hanging wall side and has been cross-cut twenty feet with no indication of the footwall.

Development work has started on the Chilko Mining and Milling Company's group of eleven claims, nine miles north of Hayden lake. Within two months a two-drill compressor will be installed so that work will be done by machine instead of hand. The other drill will be used to start a tunnel 200 feet lower on the vein, which is expected to cut a chimney of ore which was struck in the present tunnel not far from the mouth. Indications are that the ore will improve to good shipping grade in the next fifty to sixty feet.

The closing of the copper smelters at Anaconda, Mont., has in no way affected the construction work of the Anaconda Copper Milling Company holdings at Conda Idaho, where its large phosphate mines are situated. The camp is seven miles north of Soda Springs. Already the Utah Construction Company has completed a seven-mile spur to the phosphate beds. A large force of men is at work at the phosphate mine,

doing development work and putting up buildings.

The Hecla mine will continue to operate for the present in the hope that conditions will change so that it will be possible to mine at a profit and thus avoid a shutdown, according to a decision reached at a shareholders meeting held recently at Spokane. Last year's board of directors was re-elected. The officers are: J. F. McCarthy, Wallace, Idaho, president; W. J. C. Wakefield, Spokane vice-president; Mrs. Sarah E. Smith, Chicago; F. J. Kipp, Carl Landsee, Milwaukee, Wis.; Dr. Norman, Los Angeles, directors. L. E. Hanly renamed secretary.

The Sunshine Mining Company of Kellogg, operating on Big creek, will start construction of a fifty-ton capacity mill at a cost of \$25,000, and is planning other extensive improvements and development, according to E. C. Tousley, secretary and treasurer. The Yankee Boy and Yankee Girl groups of fourteen claims, situated on Big creek, seven miles east of Kellogg, have been taken over on lease and bond by the Sunshine Mining Company, and approximately fifty men are employed. In addition to the mill an assay plant will be built, a seventy-five horsepower motor and considerable machinery installed. The Sunshine company has considerable ore reserve which has a high content of silver. Assays on shipments recently made to the Bunker Hill and Sullivan and East Helena smelters ran between 113 and 146 ounces of silver to the ton. The mine is shipping three cars of high-grade ore a month. The officers are: George Kabel, president; William F. Newton, vice-president; E. C. Tousley, secretary and treasurer.

MONTANA.

Ore production large enough to assure a commercial quantity, will soon be realized by the owners of the Glengarry mine at Cooke City, according to word received here. As development work proceeds a large amount of ore will be exposed, according to F. A. Hancock engineer in charge of the mine. The Glengarry company is planning the erection of a sawmill which will furnish material for the mine.

To enable as many miners as possible to work at least part time every month, the coal mines in the Red Ledge district are carrying 845 men on their pay rolls three days per week. The same condition prevails in the Bear Creek and Washoe districts nearby. The Montana Coal and Iron Company, the Anaconda Copper Mining Company and the Smokeless and Scollins Company report practically full forces, but on short time.

NEVADA.

Water is gradually filling the shafts of the Victor, Tonopah Extension and Belmont

mines to the 1,500-foot level, says the Tonopah correspondent to the Reno Gazette. Decision to remove the pumps from those workings was agreed upon following the walkout of the mine workers on the 15th, when a reduced scale of wages went into effect.

Tonopah and Divide, Nevada, mine operators' action in reducing the wage scale 75 cents per shift resulted in a walkout which at last reports had closed down all of the leading Divide and Tonopah properties with the exception of the West End, the Halifax, the North Star, the Rescue Eula and a few others. At these properties, the management is said to have refused to endorse the action of the Mine Operators' Association and to have retained the old wage scale.

Letson Balliet, mining engineer, who recently resigned his position as head of the engineering staff of the Moore Shipbuilding Company in Oakland, Cal., is sampling the Well-Emma mine in Silver City in the interest of a group of Oakland capitalists. Mr. Balliet is the inventor of the Balliet counter balance for mine hoists and the owner of the Buckeye-Belmont mines in Tonopah. Two shifts of men are now being employed at the mine and extensive development work carried on in the vein.—Virginia Chronicle.

Three important strikes were made this month in the Cuggenheim gold workings at Jarbidge. The first strike was made in the Long Hike mine, where the ledge, cut only fourteen feet, is said to be delivering ore assaying \$20,000 to the ton. Another ledge in the same mine is yielding \$10,000 to the ton, and in the Starlight mine ore assaying \$5,000 to the ton is being taken out. The Long Hike mine is adjacent to the Kimberley Jarbidge property, and the ledge is said to run across 100 feet from the tunnel. The Kimberley Jarbidge property is owned by Kimberley and Twin Falls, Idaho, people.

WASHINGTON.

The Touchet Mining Company, at Huntsville, which reduced its output during the last season, announces it will resume operations May 1 at full capacity.

The drill of the Spokane Wild Rose Oil Company encountered an eight-foot vein of lignite coal at a depth of 491 feet when work was resumed recently.

Stockholders of the Idaho Gold & Ruby Mining Company have been notified that permanent hydraulic operations have commenced at the property at Leonia, Boundary county near the Great Northern railroad.

Owners of the Mother Lode in Oro Grande mining district, south of Elk City have purchased a 160-ton mill. The Mother Lode is a free milling free gold proposition, with a shaft sunk fifty feet on the hanging wall and a second shaft of thirty-five feet

with 150 feet of cross-cut work and a tunnel of 800 feet, assays showing gold values of \$12 per ton and upward.

The Security Copper Company of Spokane has resumed work on its property at Chewelah and expects to work on it; Chemo-kane and Butte mines, also in Stevens county, after a prolonged suspension.

The Ark Mines Company has struck the ledge on the Silver Queen mining claim, three miles south of Little Falls. The tunnel has been driven over 1,000 feet and considerable fine silver and copper ore has been uncovered. The company controls nearly all the mining claims on this hill, which was quite noted thirty or forty years ago on account of the fine outcroppings.

The Marguerite property of the Bonner Mining Company on Trestle creek will begin taking out ore for shipment and will have a carload of gold, silver and lead ore ready in thirty days. The property has three well defined veins, to cross-cut which a tunnel has been driven. This tunnel has not yet reached the Marguerite vein, the central and richest one. The ore to be shipped this spring will be taken from the first vein, three feet wide, which was recently cut.

The Double Eagle Mining Company, operating twelve miles west of Valley, Stevens county, is installing air pipes in the 500 foot shaft of the mine and is figuring on the installation of air drills. A crew of men are working extending the tunnel of the mine 300 feet, which will bring the main tunnel up to 800 feet. The mine, located on the same claim as the big magnesite quarry leased to the American Refractories Company, is showing high-grades in silver and lead and has already shipped some extra high-grade ore.

Discovery of a large body of graphite is reported at a point near the forks of the Locksawand Selway, northeast of Kootenai, and close to the proposed Lewis and Clark highway. The vein matter has been cross-cut for seventy feet and the dike of mineral matter shown to lie in a formation of granite and gneiss. Graphite is quoted as having a commercial value of \$60 to \$150 per ton, and is steel gray in color and used in the manufacture of lead pencils. Assays show the graphite contents to be 13 and 21 per cent.

Reports from Leavenworth indicate that great excitement prevailed when it became known that prospectors were in from the Old Blewett mine district and were exhibiting samples of gold taken from the bed and banks of the Peshastin creek. One nugget weighed three-quarters of an ounce and is worth about \$17 at present quotations, and many smaller ones and considerable coarse gold is said to have been found. The strike was made in the gulch about three miles below the big Blewett mine and nearer town.

There was a run on the print shop for location notices and claims will likely be staked all over the region. There has been more activity among prospectors this season than for several years.

ANOTHER OIL STRUCTURE IN EASTERN UTAH.

Another oil structure in eastern Utah is engaging the attention of oil men here, says a Moab, Utah, dispatch of recent date. It is located in the Hill creek country, on the north slope of the Book cliffs, and about sixty miles due north of Moab. Salt Lake City men have covered a large part of the acreage there and have pronounced it one of the most perfect oil structures in the state. There are reported to be evidences of oil in the structure.

Great shale beds 100 feet and more in thickness are exposed. Samples analyzed contained from forty to sixty gallons of oil per ton of shale. On the surface the Hill creek dome appears to be lying almost flat. The depth to productive sands is estimated to be from 600 to 1,200 feet. Salt Lake City men are forming a company.

The altitude of the section is from 5,000 to 7,000 feet. Several streams are available to furnish ample water for use in developing the dome.

SILVER, GOLD AND PLATINUM IN OIL WELL AT ILLIPAH, NEVADA

According to George H. Ryan, mining engineer of Ely, Nevada, and formerly of Salt Lake, unusually interesting conditions are attending the prospecting of the Illipah oil field, thirty-five miles west of Ely. In a letter written on the 14th inst. Mr. Ryan says:

"We have a fairly promising oil district at Illipah, thirty-five miles west of here, and the one well which has been drilling continuously is now to a depth of 928 feet and has had a good showing of oil for the last 200 feet. This is the deepest well in the state, so far.

"Another interesting feature of this hole is that they have had some remarkably good assays in silver and gold from some of the strata penetrated and have also found some platinum. I may have some more information about this interesting well for you in the near future, and will send in to you when I get it."

The port of Manila soon will be equipped with a modern marine railway or drydock with a capacity of 8,000 tons, according to plans launched by the Honolulu Iron Works and the Earnshaw Slipways. The cost of the project has not been decided yet and the awarding of the contract is left with the representatives of the companies in Honolulu.

Petroleum Notes

The Springville Oil and Gas Company is making preparations to resume drilling on their property near Basin, Wyoming, where a well has already been sunk to a depth of 1,400 feet. An additional depth of 300 feet is to be added, when it is expected that oil sands will be encountered.

The deep test well thirty miles east of Grand Junction, Colorado, being drilled by Carter Oil Company, was down 150 feet on the 20th. The bore is said to be the largest ever made in Colorado, the hole being started with a 22-inch drill bit. The well was spudded in on the 12th.

Drilling at the Big Six oil well near Moab, Utah, is again under way after a five-day shutdown, due to a broken fly wheel of the engine. The mishap to the engine occurred on the 15th. The well was at a depth of 1,090 feet a week ago, in a blue shale formation. Gas and oil showings are strongly in evidence with each bailing.

D. Bergera of Helper, Fred Larcher of Price and G. Becutti of San Francisco, all prominent stockholders in the Western Allies Oil Company, were in Moab recently looking over their oil interests there. Mr. Becutti, who is connected with the Bank of Italy, San Francisco, and his associates, are very favorably impressed with the oil outlook there. Their company is actively interested in sinking the Big Six test well.

The well being drilled by the Old Emery company in the San Rafael, Utah, field had passed the hundred foot mark a week ago. Some surface water had made its appearance and the drillers were figuring on casing it off, according to advices that came out by way of Huntington. The well is being drilled to permit the use of fifteen and one-half inch casing at the start and it is hoped that the water flow will not necessitate casing off at the depth attained.

A lease for railroad trackage at Greener, Utah, to be used by a big contractor for oil field operations has been acquired by Calvin Cass who is understood to represent the George Melcher Company of Casper, Wyoming. The Melcher Company contracts on a large scale freighting, rig building and well drilling in the Wyoming fields and it is understood Mr. Cass has secured the location here for a branch of the Casper company.

In response to a request made by Gould B. Blakely, register of the local United States land office, for information relative to the expiration of the time limit for the posting of notices following the granting by the general land office of a permit to prospect for oil and gas within the confines of the state, word has been received from Commissioner William Spry of the general land office, that the time for posting notices expires ninety days from the date of granting

the permit in Washington. Mr. Blakely said this will come as a surprise to many people who have been under the impression that the time would not expire until ninety days from the time the permit was received by the applicant.

During the last week something like 900 feet of casing has been put down by the Ohio Oil Company at its Huntington well. Drilling is to be resumed during the next few days with the arrival of two bits. The casing is twelve and a half inches and was not found necessary, because of the formation, until more than a thousand feet had been attained. Some trouble was had last week and previously owing to broken parts of the engine. These have been placed.

—Price, Utah, Sun, 15th.

RICO WELLINGTON ASSESSMENT VALIDATED BY COURT ACTION.

Injunction against Rico Wellington Mining Company to prevent collection of a 10 cents a share assessment on the company's outstanding stock was denied in a decision rendered by Judge Tillman D. Johnson in the United States District court on the 20th and the bill filed against the company by minority stockholders was dismissed.

Some time ago minority stockholders were granted a temporary injunction against the company restraining collection of the assessment. On trial of the case the minority stockholders sought a permanent injunction, basing their fight on a contract entered into in 1911 between the Rico Wellington company and Jesse Knight of Provo when the Knight interests acquired control of the company. The contract provided for payment of the property's indebtedness and division of dividends between the Knights and other stockholders until certain sums were paid. The property indebtedness was paid and some dividends paid, after which further debts were incurred and the assessment was ordered to liquidate them.

SILVER BLOSSOM OPENS UP ORE BODY.

Reno, Nevada, April 25.—The Silver Blossom Mines Company has opened a pay shoot of high grade about eighteen inches in width, commencing at the surface, and shipping will begin from this shortly. Taking about eight feet of this ore makes it a very profitable milling proposition. Work is also progressing in cleaning out an old incline shaft sunk many years ago in the early history of the mine and of which there is a record of a shipment of about fifteen tons that gave returns of over \$250 a ton. It is announced that Colonel Kit Carson, who was active in financing the Black Panther mine, has now undertaken the financing of the Silver Blossom Mines Company and will shortly leave for the east on the proposition.

Construction Notes

Manti, Sanpete county, Utah, is making preparation to pave the business district of the town. It is hoped to get under way in May.

The largest sidewalk paving Provo, Utah, has undertaken in many years, is promised for 1921 by City Engineer G. C. Swan. This sidewalk work is supplementary to the street paving to be done this summer.

According to report the Standard Mines Company, of Logan, Utah, contemplates the early installation of a compressor and hoisting plant at its properties near Hyde Park, Cache county.

The Sunshine Mining Company, of Kellogg, Idaho, E. C. Tousey secretary, is contemplating the construction of a fifty-ton milling plant. An assay plant and other equipment, also is under consideration.

A meeting of the Cornucopia company's stockholders will be held this month to consider and act upon a proposition to construct a mill on the company's Silver Creek property.—Central City, Colorado, dispatch.

Bids for the construction of the outfall sewer system for Ogden, Utah, which will cost approximately a half million dollars, will be called for within the next few weeks. The city plans to get the work started at as early a date as possible, in order to give some relief to the unemployment situation in the city.

Bids for the completion of the addition to the South Washington school, which it is estimated will cost about \$100,000, will be asked by the board of education of Ogden City, Utah, at once, according to announcement. The \$100,000 was voted at the bond election on the 19th. At the same time \$50,000 was also voted to purchase equipment for the Central junior high school.

A contract for the construction of a road four miles in length and sixteen feet wide from Galena to the Four Mile bridge was let by the U. S. Bureau of Public Roads in Ogden, Utah, on March 30th, to Saylor, Williams and Biel, contractors of Rupert, Idaho. It is hoped that actual work of construction will be under way by the first of June and that the road will be completed not later than the first of September.—Halley, Idaho, News-Miner, 15th.

According to advices from Blackfoot, Idaho, contracts have been awarded by the city commission for the construction of a new water system for the city. The contract price for the new system is \$190,000 and when combined with the present system will represent a plant valued at \$300,000. The contract provides for seven miles of castiron pipe and ten miles of Matheson joint pipe, varying from sixteen to four inches in width. The new system will supply suburbs, now without water, to be

pumped from two wells which are to be drilled northwest of the city hall. For emergency, a 100 horsepower semi-Diesel engine will be installed. There will be two 100 horsepower motors, two centrifugal pumps, 100 new fire hydrants of the Corey type, and a steel tank of 100,000 gallon capacity. The pump house will be fireproof.

Personal Mention

James W. Neill is now with the Union Construction Company of San Francisco.

A. H. Spencer, an old-time resident of Bluff, Utah, was a Salt Lake visitor during the past week.

E. Dana Trout, local manager of the Morton Salt Company, made a business trip to Reno, Nevada, early last week.

Herbert C. Hoover has resigned as chairman of the American Engineering Council of the Federated American Engineering Societies.

Denton Thompson has returned from a two years' sojourn in Alaska and is now with the Kennecott Copper Company, at Tecoma, Wash.

N. H. Wright of San Francisco, connected with the mining industry of Park City several years ago, was a camp visitor early in the month.

George S. Rice, chief mining engineer of the U. S. Bureau of Mines, is visiting several of the mining camps in Arizona, gathering first-hand data with regard to ventilation problems.

Capt. Thomas Hoatson, of Calumet, Michigan, a director of the Calumet & Arizona Mining Company, attended the annual meeting of the stockholders and directors of the company, held in Warren on April 11.

W. R. Calvert, field geologist for the Utah Oil Refining Company, has returned from a trip through the southeastern Utah oil fields. He was accompanied by well known oil operators from this city.

George L. Porter has resigned from the presidency of the Afterthought Copper Company at Ingot, California, and has moved to Union City, Tennessee, where he will look after some oil interests in Kentucky and Oklahoma.

F. M. Leland, formerly with the Mackey Mines Company, Mackay, Idaho, with headquarters in Salt Lake, is touring southern Europe with Mrs. Leland, on a pleasure trip. Earlier in the month they were at Naples, Italy. They expect to be gone about six months.

F. V. A. Kesselhut, well known petroleum geologist who has been making investigations in the San Juan oil fields for Wyoming and California clients, returned to Salt Lake Wednesday. He was very favorably impressed with the looks of things in San Juan

and is confident the field has a future as an oil producer.

K. Baumgarten has been appointed as a mining engineer of the United States Bureau of Mines, attached to the Mississippi Valley Station at St. Louis, Mo. Mr. Baumgarten's professional experience embraces a period of some fourteen years spent in operations and examinations in this country and in Mexico.

S. V. Clevenger, an expert well driller who has done considerable work for the Sullivan Machinery Company in many portions of the world, came down from Idaho about the middle of the month and left for the southern Utah fields with a view of sizing up conditions and looking into the possibilities of landing drilling contracts in that region.

Grant Snyder returned from a several weeks' trip to Los Angeles on the 22d. Oil shale and mining propositions with which he is identified were subjects of consideration during his absence. He states that much interest is shown in Utah oil shales and that drilling operations in the southern Utah oil fields also are being closely followed.

Max F. Raddatz, brother of E. J. Raddatz, president of the Tintic Standard, died at his southern California home on the 15th of asthma. Deceased was superintendent of the North Beck company's properties at Tintic and went down to the coast for his health a short time ago. He was well known in the Tintic district, as well as at Stockton, where he was foreman of the old Honerine mine several years ago.

Judge Norman W. Haire, a well known lawyer and mining man of Salt Lake, died at his home in this city on the 22nd, after an illness lasting two years. Judge Haire came to Utah from Michigan and for a number of years was the controlling entity in the Michigan-Utah Mining Company, operating at Alta, in the Little Cottonwood district. Funeral services were conducted by the Masonic fraternity on the 25th.

TRADE NOTES.

A. E. Hopley, San Francisco, distributor of the Gibson quartz mill, has just issued a handsome and superbly illustrated catalogue in which all the latest improvements and refinements of this easily portable and efficient quartz mill are shown.

The Stearns-Roger Manufacturing Company, of Denver, has been awarded by the Catlin Oil Shale Products Company a contract for new equipment for its plant at Elko, Nevada, including two large gas producers, twelve and one-half feet in diameter. It is understood that the drafting of this apparatus has been completed and that the work of construction will be started immediately in the shops of the Stearns-Roger Manufacturing Company at Pueblo, Colorado.

United States Smelting, Refining and Mining Company

Buyers of

Ores and Concentrates

Matte and Furnace Products

TERMS QUOTED FOR SMELTING ORES, ALSO FOR CONCENTRATING ORES CONTAINING LOW PERCENTAGES OF BOTH LEAD AND ZINC, ON APPLICATION TO THE UNITED STATES SMELTING, REFINING AND MINING COMPANY, NEWHOUSE BLDG., SALT LAKE CITY. SMELTER AND LEAD AND ZINC CONCENTRATING AND SEPARATING MILLS AT MIDVALE, UTAH; COPPER SMELTER AT KENNETT, CALIFORNIA; ZINC SMELTER AT CHECOTAH, OKLAHOMA; LEAD AND ZINC CONCENTRATOR AT NEEDLES, CALIFORNIA; LEAD REFINERY AT GRASSELLI, INDIANA.

INSECTICIDES, FUNGICIDES, WEED KILLER, POISON BAIT, FOR SALE BY OUR AGRICULTURAL DEPARTMENT, NEWHOUSE BUILDING, SALT LAKE CITY, UTAH.

SALT LAKE MINING STOCK QUOTATIONS

The range of the market from April 11, 1921, through April 23, 1921, inclusive. Quotations furnished by J. A. Hogle & Co., direct wires to all leading markets, 169 South Main St., Salt Lake City, Utah, and ground floor Eccles Bldg., Ogden, Utah.

Stock	Open	High	Low	L. S.	CLOSING		Sales
					Bid	Asked	
Alta Mich.	.01 1/2	.01 1/2	.01 1/2	.01 1/2	.01	.01	1,000
Antelope Star	.04 3/4	.05 1/2	.03 1/2	.03 3/4	.03 1/2	.04	47,800
Alta Con.	.02 1/4	.02 1/4	.02 @	.02 @	.02	.02 1/4	1,000
Albion Cons.	.07	.07	.06	.06 1/2	.06 @	.07	2,370
Am. Metals	.01 1/2	.01 1/2	.01	.01	.00 1/2	.01 1/4	7,500
Alta Tun.	.10	.10	.07 1/2	.07 1/2	.06 1/2	.07 1/4	23,200
Bullion	.04	.04 1/2	.04	.04 1/4	.03 1/2	.04 1/2	6,000
Big Hill					.01 1/2	.03 1/2	
Big Cot. Coal.					.02	.03	
Beaver Cop.	.04 1/2	.04 1/2	.02 1/2	.02 1/2	.02 1/2	.02 3/4	25,500
Bay State	.35	.35	.31 1/2	.32	.28	.33	5,700
Black Metal	.03	.03 1/4	.03	.03 1/4	.02 1/2	.03 1/2	4,700
Cent. Eureka					.01 1/2	.02 1/2	
Cedar Talis.	.01 1/4	.01 @	.01	.01	.00 3/4	.01	3,000
Colb. Rexall	.22 1/2	.26 1/2	.22 1/2	.25 1/2	.25 1/2	.26	6,650
Colo. Con.					.01 3/4	.03	
Crown Point					.01 1/2	.02 1/2	
Cardiff	1.25	1.20	1.15	1.15	1.10	1.15	1,500
Croff	.02 1/4	.02 1/4	.02	.02	.01 1/4	.02	2,000
Daly					1.50	2.10	
Daly West					2.50	3.50	
Dragon					.01	.07	
Demijohn Con.	.00 3/4	.00 3/4	.00 3/4	.00 3/4	.00 3/4	.01	4,000
Emma Silver	.01 3/4	.02	.01 3/4	.01 3/4	.01 3/4	.02	9,200
Empire Mines					.02	.04 1/2	
E. Prince					.02	.05 1/4	
Empire Cop.					.04	.04 1/4	8,000
Eureka Mines	.04	.04 1/4	.03 3/4	.04	.04	.04 1/4	1,000
E. Crown Pt.	.01 1/2	.01 1/2	.01 1/2	.01 1/2	.01 1/4	.01 3/4	1,000
E. T. Coal.	.00 3/4	.01	.00 1/2	.00 3/4	.00 3/4	.01	2,310
E. T. Con.	.08	.08	.08				3,000
East Antelope					.00 1/4		
Eureka Lily	.08	.08	.07 1/4	.07 1/2	.07 1/2	.07 3/4	20,800
Eureka Bullion	.08	.08 1/4	.07 1/2	.07 1/2	.07 1/2	.07 3/4	37,900
Gold Chain					.04	.05 1/2	
Grand Central					.22	.35	
Great Western					.03	.04	
Howell	.07 1/2	.08 1/2	.07 1/4	.08 1/2	.08	.08 1/2	6,551
Home Run	.01 1/2	.01 1/2	.01 1/2	.01 1/2	.01 1/2	.02	1,000
Iron Blossom	.15	.16	.15	.16	.15	.18	2,100
Indian Queen	.00 1/2	.00 1/2	.00 1/2	.00 1/2	.00 1/2	.00 3/4	2,000
Iron King	.11	.11	.09	.09	.08 1/2	.09 1/2	2,700

ORE SHIPMENTS.

Waiting for changed smelter and freight conditions, shipments from the camp of Pioche are ruling light. Bristol Silver has sent to market 465 tons during the past two weeks, while the Utah Currency lease on Consolidated Pioche-Nevada, has marketed forty tons.

Park City.—Outside of the Judge Allied Mines and Silver King Coalition, very little ore is moving out of this famous silver-lead district. Contributors for the two weeks ending on the 22nd were:

Judge Allied Companies 1,508 tons
Silver King Coalition 1,247 tons
Ontario Silver, to clean up 55 tons

During the two-week period ending on the 22nd the mines of Tintic sent out 240 carloads of ore, the contributors during the last week of the period being as follows:

Tintic Standard 47
Chief Consolidated 32
Iron King 15
Iron Blossom 8
Victoria 6
Dragon 4
Eagle & Blue Bell 3
Swansea 3
Eureka Mines 1
Alaska 1
Gemini 1

SAN FRANCISCO MINING STOCKS.

April 23.	Bid.	Asked.
Booth	.03	.03
Blue Bell	.01	.01
Comb Fraction	.02	.02
Florence	.30	.30
Goldfield Con.	.06	.07
Kewanas	.01	.02
Jumbo Extension	.06	.07
Lone Star	.03	.04
Silver Pick Con.	.05	.06
Yellow Tiger	.02	.02
Gold Wedge	.01	.01
Manhattan Con.	.01	.02
White Caps	.06	.07
Grandma	.01	.01
Spearhead Gold	.02	.03
Crackerjack	.03	.04
Great Bend	.01	.02
Con Virginia	.50	.51
Hale & Norcross	.25	.25
Mexican	.14	.16
Ophir	.18	.19
Savage	.05	.05
Sierra Nevada	.07	.07
Union	.23	.23
Belmont	.01	.01
Cash Boy	.04	.05
Gipsy Queen	.01	.01

Jim Butler	.07	.09
Mon Pits Extension	.03	.04
MacNamara	.13	.13
North Star	.03	.04
Rescue Eula	.15	.16
Tonopah Extension	1.50	1.50
West End	1.02 1/4	1.05
Nevada Hills		.01
Round Mountain		.16
Tonopah Divide	1.15	1.20
West Tonopah	.03	.05
Eureka Croesus	1.50	1.50
Red Hills Flo	.01	.02

METAL MARKET, APRIL 23.

Silver, domestic	99 1/4 c
Silver, in London	35d
Copper	12.375c
Lead, New York	\$4.25
Spelter, St. Louis	\$4.85 @ 5.00

BOSTON STOCK QUOTATIONS.

April 23.	Bid.	Asked.
Bingham Mines	8 1/2	9
Chief Con.	2 1/2	2 3/4
Daly West	2 3/4	3
Iron Blossom	.10	.20
Mason Valley	1	1 1/2
Utah Apex	3 1/2	4
Utah Consolidated	3 1/2	2 3/4

DIVIDEND ANNOUNCEMENTS.

With the payment on May 2 of the second quarterly dividend of the Chief Consolidated

Mining Company for 1921, the disbursements of the Tintic bonanza will nearly reach the \$2,000,000 mark. Payment of the 5-cent per share dividend declared for the second quarter, a total disbursement of \$44,201.60, brings the grand total of dividends paid by the company to \$1,959,920.87.

NEW YORK STOCKS.

April 23.	Bid.	Asked.
Am. S. & Refining	40	40 1/2
Cerro de Pasco	28 1/2	28 1/2
Chino Copper	23 1/2	24
Ontario Silver		4
Ray Consolidated	13 1/4	13 1/4
Nevada	12	12
Utah Copper	53 1/4	54

ASSESSMENTS PENDING.

Crown Point Mining Company, 1c a share. Delinquent May 14. Sale day June 10.

American Metal Mining Company, 1/2c a share. Delinquent May 23. Sale day June 25.

For Lease—Silver-Gold Property—Shipping ore in sight. A two hundred foot shaft with drifts on three levels, eight miles from the railroad station, good road. Write for particulars. Paul Webster, Sulphur, Humboldt County, Nevada.

All Sums of Depletion Must Be Promptly Set Up

TO DO THIS

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The Salt Lake Mining Review

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Slate Dust in Asphalt Road Surface Mixtures

BY OLIVER BOWLES*

It is noteworthy that 80 to 95 per cent of the gross production of all slate quarries in the United States is discarded as waste. In view of the loss involved in handling so much waste, and the consequent added cost of the finished product, the bureau of mines has undertaken a study of the slate industry for the purpose of devising the best means of reducing the proportion of waste, and of utilizing the unavoidable waste. The utilization of waste has received special attention, and the co-operation of many prospective purchasers of waste slate has been enlisted in testing its adaptability for various uses.

The manufacture of filler for road asphalt mixtures is a promising field for slate waste utilization.† In the preparation of asphaltic mixtures for surfacing roads, in addition to the sand, or stone and sand aggregates, finely pulverized limestone or Portland cement are used as fillers.

In asphaltic mixtures in which by-product asphalt is used the weight of filler and asphalt are substantially the same, but when Trinidad and certain other native asphalts are used a somewhat smaller proportion of filler is required. The tonnage of filler used in such asphalt mixture is very great; one authority estimating that the city of New York alone requires 50,000 tons per year.

As road-building is such an important industry, and as intimations had been received from several sources that slate flour constituted a superior filler for road asphalt mixtures, an attempt was made to obtain more definite data as to the adaptability of slate flour for such a use.

In order to obtain practical tests the co-operation of manufacturers was requested, and as a result several companies kindly offered to test the material in their experimental laboratories. Samples of finely pulverized slate were submitted for this purpose. Results of the most complete tests are given in the following paragraphs:

Impact and Compression Tests.

The slate flour submitted was of such a fineness that 99.3 per cent would pass a 100-mesh, and about 80 per cent pass a 200-

mesh screen. Tests were made to determine its suitability as a filler in asphalt pavements, both on asphalt bonded briquets and on standard sheet asphalt pavement mixtures. The briquets were prepared by adding 10 per cent of "D" grade Calol asphaltum of 65 penetration to the slate dust, and increasing the amount by 2 per cent until the pat test showed only a slight excess. The completed briquets contained 20 per cent of asphaltum. They were made at a temperature of 300 to 350 degrees F. The standard sheet asphalt consisted of a mixture of "D" grade, 67 penetration asphaltum with slate dust and sand. Its composition by weight is indicated below:

Asphalt	10 per cent
Slate dust filler	13 per cent
Sand, retained on 200 mesh screen	13 per cent
Sand, retained on 100 mesh screen	13 per cent
Sand, retained on 80 mesh screen	24 per cent
Sand, retained on 50 mesh screen	11 per cent
Sand, retained on 40 mesh screen	8 per cent
Sand, retained on 30 mesh screen	5 per cent
Sand, retained on 20 mesh screen	3 per cent
Total sand	77 per cent
Total	100 per cent

The standard sheet surface mixture was tested for impact with a large Page impact machine having a two-kilogram hammer dropping from a height which was increased one centimeter with each successive blow. For the asphalt bonded briquets a small Page impact machine was used. The cementing value under compression was determined by subjecting the briquets to pressure increasing uniformly at the rate of 600 pounds per square inch per minute.

Similar mixtures with limestone dust and Portland cement, the materials commonly employed as fillers in asphalt pavement, were prepared, using the same proportions by weight as in the slate flour mixtures

given above. The results of the tests are shown in the following table:

Results of Impact and Compression Tests.

ASPHALT BONDED BRIQUETS.			
Material	Im-	Compres-	Remarks
	pact	sion	
Slate flour	59	897	Briquets flattened; good cementing value.
Portland cement	59	764	do
Limestone dust	58	600	do
STANDARD SHEET SURFACE MIXTURE.			
Material	Im-	Compres-	Remarks
	pact	sion	
Slate flour as filler, 13%	25	572	
Portland cement as filler, 3%	20	493	
Limestone dust as filler, 13%	24	600	

From these results it is evident that in asphalt bonded briquets slate flour is superior to both Portland cement and limestone dust in resistance to compression, which is a measure of its cementing value. In the standard sheet surface mixture it is intermediate between limestone dust and Portland cement. As regards impact, there seems to be little choice between the three substances tested as filler in asphalt bonded briquets, but in standard sheet surface mixture there is some indication of superiority on the part of the slate flour.

It is to be noted that the proportion of fillers used was determined on the basis of weight and not of volume, and as the materials used vary in specific gravity a different volume was used in each instance. If the fillers had been added on the basis of volume somewhat different results might have been obtained, particularly for Portland cement, which is considerably heavier than either limestone or slate. The results obtained, therefore, are indicative only, and are not conclusive.

In any dust used in asphalt mixtures,

Material	Screen Test	Time of Subsidiation	Percentage of Material Decanted	Percentage Recal'lated on a 200-Mesh Basis	Percentage Recal'lated on a 200-Mesh Basis
Red slate	98% thru 200 mesh	15 sec.	97.8	99.8	....
Lanhartsville, Pa.	96.4% thru 300 mesh	1 min.	89.0	....	92.3
Do	Do	15 sec.	76.4	85.9	....
Light Gray slate	88.8% thru 200 mesh	1 min.	61.8	....	71.8
Albany, Pa.	86.1% thru 300 mesh	15 sec.	89.2	93.9	....
Do	Do	1 min.	74.0	....	82.0
Gray slate,	95% thru 200 mesh	15 sec.	85.6	99.5	....
Northampton Co., Pa.	90.2% thru 300 mesh	1 min.	67.8	....	85.8
Do	Do	15 sec.	87.7	97.1	....
Do	86.0% thru 200 mesh	1 min.	71.9	....	8.50
Do	79.0% thru 300 mesh	15 sec.	....	....	....
Do	Do	1 min.	....	....	....
Do	90.3% thru 200 mesh	15 sec.	....	....	....
Do	84.6% thru 300 mesh	1 min.	....	....	....
Do	Do	15 sec.	....	....	....

*Mineral technologist, Bureau of Mines.

†Acknowledgment is hereby made of information on asphalt mixtures kindly supplied by H. M. Milburn of the Bureau of Public Roads, Department of Agriculture.

only that part which is finer than 200 mesh is available as filler, all material coarser than 200 mesh being regarded as aggregate rather than filler. Clifford Richardson in his book entitled, "The Modern Asphalt Pavement," states that "only particles smaller than 0.05 mm. in average diameter are to be regarded as true dust, and it is even better to have a considerable proportion of the dust finer than 0.05 mm. in diameter."

The best way to determine the percentage of very fine material is by settlement and decantation tests. Such tests of slate-dust samples were made in the laboratory of the Bureau of Mines in accordance with the method outlined by Richardson and termed by him the elutriation method. Five grams of slate dust were placed in a 600-c.c. beaker about 120 mm. high. The beaker was then nearly filled with distilled water at a temperature of exactly twenty degrees C, and the contents were agitated with an air blast until the dust and water were thoroughly mixed, care being taken to produce no cyclonic currents.

The liquid was then allowed to stand for a fixed period of time, after which the water and suspended dust were decanted, leaving the sediment in the bottom of the glass. This was repeated three times. It is regarded that particles thus held in suspension for a fifteen-second period have a diameter of approximately 0.08 mm., and those that remain in suspension for a period of one minute have a diameter of 0.05 mm., although these figures may vary somewhat, depending on the specific gravity of the materials employed. Tests were made at both fifteen-second and one-minute periods, the results of which are shown in the preceding table:

Results of Settlement and Decantation Tests.

It is to be noted that the tests were made with materials various percentages of which failed to pass a 200-mesh screen. As 200-mesh material only is to be considered as effective filler, it seems important to eliminate from the determination the percentage of material coarser than 200-mesh, and to recalculate the fine dust on the basis of that which passed 200 mesh. Thus in the fifth column of the table is given the percentage of 200-mesh slate flour which remains in suspension at the end of a fifteen-second period.

For purposes of comparison a recalculation was made indicating the percentage of 300-mesh slate flour which remains in suspension at the end of one minute, and this is shown in the sixth column. It may be observed that the material held in suspension at the end of a fifteen-second period is a little finer, though almost equivalent to that which passes a 200-mesh screen. Material held in suspension at the end of one minute is considerably finer than that which passes a 300-mesh screen.

In order to arrive at an intelligent com-

parison of slate flour with other filler materials, the following table has been prepared from Richardson's results as given on page 94 of the book to which reference has already been made. The percentages have been recalculated on a 200-mesh basis:

ELUTRIATION TESTS AS GIVEN BY RICHARDSON.
(Time of Subsidence, 15 seconds.)

Material	Screen test	Percentage decanted	Percentage recalculated on a 200-mesh basis
Limestone	94.0% through 200 mesh	71.3	84.9
Trap rock	81.0% through 200 mesh	70.3	86.8
Portland cement	74.0% through 200 mesh	56.7	76.6

From this table it may be seen that for limestone, trap rock or Portland cement only 75 to 85 per cent of the 200-mesh material is to be regarded as fine dust suitable as a filler, while as shown in the earlier table, the fine dust in slate flour approximates 100 per cent of all that passes the 200-mesh screen. Slate dust is, according to these tests, a much more economical filler than either limestone or Portland cement, in that it provides a larger amount of effective filler for each ton of pulverized material purchased. It is to be observed that in modern practice Portland cement is somewhat finer than that used in the above tests, and consequently may give better results.

Volume Weight.—Filler materials are purchased by weight, and, other considerations being equal, that filler is the most economical which occupies the greatest space per weight purchased. A very heavy filler fills a relatively small space as compared with a light one. As specific gravity is the weight of a unit volume of a material compared with that of an equal volume of water, specific gravity may be regarded as a measure of relative volume weight. A comparison of the fillers under consideration indicates that Portland cement has a specific gravity of about 3.1, average limestone about 2.77, and the average slate of Northampton county, Pennsylvania, about 2.78. Slate is, therefore, about equal to limestone in this respect, and has an advantage over Portland cement by about 10 per cent in volume for a given weight.

Cost.—It is difficult to make any definite statement as to relative costs of fillers, for the production of pulverized slate is an industry not yet established on a sufficiently large scale to permit uniform price quotations in bulk shipments. For the limited shipments now made in barrels and bags in carload lots, prices vary greatly in different localities. It is safe to estimate, however, that slate flour can be placed on the market at little more than half the present price of Portland cement. Current prices of pulverized limestone indicate a decline almost to pre-war levels, and it is yet an open question whether producers of slate flour can compete successfully in price with producers of pulverized limestone.

Summary and Conclusions.

In order to find a useful outlet for waste

material at slate quarries, tests were made to determine its value as a filler in asphalt road surface mixtures. Actual tests in laboratories of companies preparing road asphalt mixtures indicate that for resistance to impact slate flour is about equal to other

fillers in bonded briquets, and somewhat superior in sheet surface mixtures. In cementing value it is superior to both limestone and Portland cement in asphalt bonded briquets, and intermediate between them in standard sheet surface mixture.

Elutriation tests indicate that slate flour contains approximately 15 to 25 per cent more of the fine dust that constitutes effective filler, than either limestone, trap rock or Portland cement.

In volume weight slate is about equivalent to limestone, and approximately 10 per cent superior to Portland cement. The cost of slate flour is little more than half that of Portland cement, but its ability to compete in price with limestone is not yet established.

The tests already made are not sufficiently comprehensive to give conclusive results, but they are definite enough to suggest possibilities of such importance as to induce further and more extended research both by slate producers, and by manufacturers of asphalt road mixtures. The preliminary tests recorded above indicate that the use of slate flour as a filler in asphalt road surface mixtures would result in improved highways, and that a wide use of such filler would afford a profitable outlet for waste slate with consequent advantage to the slate producing industries. It is highly desirable that the conclusions reached in laboratory tests be verified by practical tests on experimental roads.

—o—

The Mining Review acknowledges receipt of the prospectus of the Warren Commercial Club, of Warren, Idaho. The primary objects and purposes of the club "are to advance and protect the mining industry of the Warren mining district of the state of Idaho." The club has mapped out a comprehensive and broad plan of giving the district, reputed to have a production of more than \$25,000,000 in gold, deserved and unbiased publicity to the end that its resources and opportunities may become better known to the world. S. J. Pointon is secretary of the club. The influence of the club should become a powerful lever in legitimately boosting the mineral wealth and possibilities for investment in the region of Warren.

Mine Finding in Coeur d'Alenes; Lucky Discovery of Hercules

By FRED LOCKLEY*

Dan McConnell of Wallace, Idaho, was a recent guest of the Hotel Portland. The Coeur d'Alene district, of which Wallace is one of the principal cities, for many years has been one of the leading lead producing districts of the United States. It was first settled by the missionaries of the Jesuit order, who established a mission in the St. Joe river valley in 1842. They moved their mission to its present site on the Coeur d'Alene river in 1846.

[The Mining Review is advised that the "old mission" on the Coeur d'Alene river was abandoned years ago. It is now at De Smet. The old building is still in place. The whole structure was built without a single nail being used.]

Until 1854 Father Joset with several brothers and 300 Coeur d'Alene Indians were the only inhabitants of the Coeur d'Alene district.

In 1854 Lieutenant John Mullan came into that country to explore a route for a wagon road to connect Fort Benton and Fort Walla Walla. The road was begun in 1855 and completed in 1861.

Gold the First Lodestone.

One of the first prospectors in the district was Thomas Irwin, who located a quartz claim on Elk creek, not far from the Mullan road, in 1878. The following year A. J. Pritchard with his party discovered rich ore on Pritchard creek. In the winter of 1882-3 Patrick Flynn and Mr. Gillett found placer gold in this district, which caused a stampede of miners in the spring of 1884.

In those days the district was considered valuable only as a gold placer district, but the presence of the lead-silver ore on the south fork was known.

In that same year, 1884, Colonel N. B. Wallace put up a cabin and store at Placer Center, later renamed Wallace for this pioneer storekeeper.

W. B. Heyburn began work in the same year in Polaris gulch. It was also this season that John Carton and Alameda Seymour located the Tiger claim on Canyon creek.

Bunker Hill Discovered in 1886.

In those days the only means of communication and transportation with the South Fork district was by means of what was called the Evolution trail. In 1885 the entire population of Shoshone county was less than 1,500, and Murray was made its permanent county seat. It was in this same year that Phil O'Rourke, N. S. Kellogg and Jake Goetz discovered the famous Bunker

Hill mine, on the south fork. The next spring saw a big rush of miners to the district who had heard of the richness of the Tiger, Granite, Poorman, Morning and other mines.

A state road was put in to connect the South Fork district with the outside world and ore from the Bunker Hill mine and the Sullivan mine was freighted out by wagon to Mission, on Coeur d'Alene lake, from which place it was taken by boat to the outlet of the lake and shipped to Helena, Mont.

\$3,000,000 Company is Formed.

The following year, 1887, a narrow gauge railroad, called the Coeur d'Alene Railroad & Navigation Company railroad, was built from Mission to Wardner Junction, near the mouth of Milo creek. In April, 1887, both the Bunker Hill mine and the Sullivan mines were sold to S. G. Reed of Portland, who formed a \$3,000,000 company called the Bunker Hill and Sullivan Mining and Concentrating Company. Martin Winch, also of Portland, was made superintendent of Mr. Reed's mining interests in the Coeur d'Alenes. Mr. Reed disposed of his interest in these mines because of failing health.

Within a few years they had paid many times more in dividends than the price he had received for them, and they have been producing millions of dollars in profits for the owners ever since. That year saw heavy production of lead and silver ore not only in the Tiger and the Bunker Hill and Sullivan mines, but also in the Stewind, the Last Chance, the Poorman, the Granite and the Sierra Nevada.

Metal Production Climbs.

In 1890 both the Northern Pacific and the O. R. & N. built their lines into the district. When wages were reduced in 1892 from \$3.50 a day the miners in the entire district went on strike. Non-union men were attacked by the miners and troops were called into the district. In 1901 the Hercules was discovered and two years later the Snowstorm came in with rich copper ore.

In 1884 the entire mineral values mined in the Coeur d'Alene district consisted of 12,500 ounces of gold, valued at \$258,375. In 1886, 3,000,000 pounds of lead was mined and 116,246 ounces of silver.

Twenty years after the first lead had been mined in the district, and this was in 1906, more than two billion pounds of lead had been shipped, with a total value of \$86,873,409, while 68,095,054 ounces of silver had been mined, with a total value of \$43,779,860. The past fifteen years has seen tremendous production in this district.

Notorious Harry Orchard Hercules Discoverer.

The discovery of the Hercules mine came about through a mere fluke, according to the story told by old miners. It was Harry Orchard, now serving time in the Idaho penitentiary for the murder of ex-Governor Steunenberg, who made the discovery.

The Day brothers of Idaho, now heavy stockholders in the Portland hotel, were in those days prospectors. Running short of money to pay their miners, they issued stock to them in payment for their work.

Harry Orchard was one of their workers. A tunnel had been driven in search of the paystreak, but the streak was elusive. Finally the mining crew became discouraged and decided to go where they could receive cash for their work.

After they had quit and as they were coming out of the tunnel Harry Orchard drove his pick into the wall of the tunnel and left it sticking there. At the tunnel's mouth all sat down to talk it over.

One of the men suggested that they go in and blast out the holes they had already driven, and if they had not struck the paystreak they would all quit. This was agreed to; and on their way back one of the miners pulled out the pick that Orchard had stuck into the wall. It dislodged a shovelful of earth from the wall.

By the gleaming candle which he carried he saw the glint of metal. At his shout the other workmen hurried up and a dozen more vigorous blows of the pick disclosed the paystreak for which they had been in search and which they had so nearly missed finding.

Orchard's impatient act in sticking his pick into the wall disclosed the paystreak in the Hercules mine, which is now valued at \$16,000,000.

ALVAN T. SIMONDS ECONOMIC PRIZE AWARDS.

The prizes offered by Alvan T. Simonds, president of the Simonds Saw Manufacturing Company, Fitchburg, Mass., to encourage the study of economics in high schools and normal schools, of \$1,000 and \$500 for the two best essays on the subject, "Present Economic Conditions and the Teachings of Adam Smith in the Wealth of Nations," have been awarded by the judges as follows:

First prize of \$1,000 to David Koch, High School of Commerce, New York City. Second prize of \$500 to Aloysius Thiemann, Reedsburg High School, Reedsburg, Wis.

Essays were submitted from every section of the United States and from Canada. Practically every state was represented. A very large proportion came from New York City, where the study of economics is required of all seniors in the High schools.

*Reminiscent sketch in Portland Journal.

Latest Oil Field Leasing Regulations are Favorable

Secretary of the Interior, Albert B. Fall, has recently promulgated a new ruling with respect to the issuing of permits to prospect for oil and the granting of leases under the terms of the oil land leasing law. Secretary Payne had previously ruled that the development of oil on any structure would automatically cancel any other applications for leases on that structure and leave the applicants subject to such restrictions and rules as the department might see fit to apply following the striking of oil. According to Secretary Fall's interpretation of the law the former secretary's ruling was not in accord either with the spirit or intent of the law. Secretary Fall declares in effect that permits will be granted regardless of the fact that oil may be struck on a designated structure during the pendency of other applications on the same structure. The new ruling is interpreted to mean that all applications on the undeveloped structures in Utah will ultimately be granted where the regulations have otherwise been complied with.

Another ruling was also made which applies to conditions in the San Juan field in particular and which will admit of the granting of five permits to an assignee if the ground is contiguous or so closely associated in location as to be considered common ground.

Secretary Fall's new rulings seem to attain the object sought by Senator Smoot's proposed amendments to the leasing law and sets at rest a controversy that has been a most disturbing factor in the development of the Utah fields ever since the oil land leasing law went into effect February 25, 1920.

Government Support is Assured.

Out of a total of 7,300 applications for permits from all parts of the United States that have been filed since the law became effective, nearly half were entered in this state. Practically all of them asked for prospecting rights on four sections, or 2,560 acres, and covered most of the southeastern corner of the state. Wyoming is thought by land officials to be the next to Utah in point of number of applications filed.

The ruling of the secretary evidently means that every support is to be given by the government to the desire to develop oil in the western country. Applicants who hoped to receive their permits and who planned to organize oil drilling companies may now go ahead in the assurance that they may be permitted to prospect the ground. In the opinion of land office officials, it is the most important ruling that has been received here for many a day.

San Juan Situation Cleared.

In San Juan county much of the land was taken up in 1908-09 under placer mining laws. Under section 19 of the leasing act permits are to be granted on these lands where the locator has complied with the conditions prescribed.

These permits will be allowed to such an extent that a drilling company will be permitted to prospect on 12,800 acres on claims that can be grouped. It is declared that indications from the department are that patents will be issued for San Juan county lands which were located as placer claims and on which a discovery of oil was made and where the locator subsequently gave evidence of good faith in attempting to keep up his representation work.

"The statute, however," quoting Commissioner Fall's ruling, "specifically forbids the allowance and approval of a prospecting permit upon lands within a 'known geological structure of a producing oil or gas field,' (section 13), and in section 17 provision is made for the disposition of unappropriated lands in such structures by competitive bidding. Therefore, nothing in this opinion shall be construed as modifying or affecting previous decisions of this department to the effect that prospecting permits cannot be allowed within the geological structure of a producing oil or gas field, so known and existing at and prior to the filing of the application for the prospecting permit.

"Section 19 of the act of February 25, 1920 (41 stat. 437), gives to certain persons who had located or acquired placer mining claims and who are able to meet other requirements imposed in the law, a preference right to prospecting permits upon such locations 'upon the same terms and conditions, and limitations as to acreage, as other permits provided for in this act.'

"The limitation as to acreage which may be included in a single permit is found in section 13—2,560 acres. There is no limitation in section 19 as to the number of permits which may be obtained by a qualified person or persons who held the placer mining claims and are able to meet the conditions of the act.

"As an administrative matter and in harmony with the evident intent of the act to avoid monopoly, a regulation was embodied in the oil and gas regulations of October 29, 1920, page 37, to the effect that qualified assignees since October 1, 1919, may secure preference right permits, 'but no such transferee will be permitted to hold permits exceeding 2,560 acres for such lands in the

same geological structure, nor more than three times that area in the same state.'

Intent of Act is to Encourage Prospecting.

"While the intent of the act is to prevent monopoly, its primary purpose was to encourage prospecting for and development of the oil and gas resources of the United States. In localities remote from transportation, refineries, pipelines and sources of supply, it may be difficult to secure the exploration of a wildcat territory if the person or corporation conducting the exploration and development is limited to a maximum of 2,560 acres. Moreover, as stated above, section 19 is a remedial section, designed to take care of equitable claims of those who had initiated claims under the placer mining laws prior to withdrawals or prior to the repeal of the general mining laws as applicable to oil and gas deposits, and consequently no limitation was made in the statute as to the number of such locations which might be surrendered and made the basis of prospecting permits.

"The limitation above quoted is one of regulation and expediency and not of statute. Therefore, having in mind the purpose of the act and the scope of section 19, it is held that for development purposes, assignments of prospecting permits secured under section 19 of the act, to a qualified individual, corporation or association outside producing oil and gas fields and in localities without transportation facilities, refineries, pipelines or nearby sources of supply, for not exceeding five such permits in a state and near enough to each other for common development, whether contiguous or non-contiguous, may be presented for the consideration of the secretary of the interior, and his approval if he shall find same to be in the public interest.

"To the extent of its conflict with the foregoing, said regulation under section 19 of the act of February 25, 1920, is modified."

Text of Secretary's Orders.

The orders, as issued by Secretary Fall, are as follows:

"Based upon rulings of the secretary of the interior, the regulations concerning oil and gas permits and leases approved October 29, 1920, state, on page 36, 'where, after application under section 13 for a permit and before permit is granted the land is designated as within the structure of a producing oil or gas field, permit cannot be allowed.'

"This regulation and the ruling on which it is based were not issued under a mandatory provision of the statute, section 13 of the act of February 25, 1920, authorizing the secretary of the interior to grant to any qualified applicant a prospecting permit upon lands 'wherein such deposits belong to the United States and are not within any known geological structure of a producing oil or gas field.'

"Rulings of this department in cases involving a like situation, arising under land

laws, are to the contrary. In the case of Charles C. Conrad (39 L. D. 432), where a homestead application was filed, and where the entryman had performed all acts necessary to complete his application, but by reason of delay in action thereupon by the local office, a first form withdrawal under the reclamation act intervened, the department held that his rights could not be prejudiced by the inability of the local office to allow the application until after the withdrawal, but that they related back to the time when he filed in the local land office his application, accompanied by the required showing, including the fees, the land being then subject to his application.

Court Decisions Approved.

"This and similar rulings of the department are approved in principle by the recent decisions of the supreme court of the United States in cases of Payne vs. Central Pacific

Railway Company (February 28, 1921); Payne vs. New Mexico (March 7, 1921), and Wyoming vs. United States (March 28, 1921).

"Applying the principle so announced, it is clear that not only equitable but legally qualified persons who filed proper applications for oil or gas prospecting permits under the act of February 25, 1920, cannot and should not be deprived of their rights if, because of delay in action upon the applications so filed, there intervenes a designation by this department of the lands as being within the geological structure of a producing oil or gas field occasioned by a discovery of oil or gas subsequent to the filing of the application in the local land office. Accordingly, said regulation is hereby revoked, and in future applications will be adjusted in accordance with the views herein expressed.

California and Nevada Men Crowding Into Arizona Rush

Kingman, Arizona, May 10.—Gold-bearing veins, presenting ore yielding potentialities similar to those which caused the sensational "rushes" to Cripple Creek and Goldfield, demonstrate that the Union Pass section of the River Range country is one of exceptional mineral promise. During the past few weeks the area has been inspected by many practical miners and engineers and the consensus of their opinion is that a gold mining camp of proportions will soon be established there. A number of properties along the course of the Katherine vein, the mother lode of the district, have already been taken over by mining men from abroad, and the same condition applies in a lesser degree to mine acreage located along the strikes of the veins that parallel the massive uplift of the mother lode.

California and Nevada Men in the Rush.

California is represented in the new camp by Frank Allen, a director and large stockholder in the Kennedy and Argonaut mines; Charles N. Miller, who is operating the Morning placer mine in the Feather River country; Frank Littlefield, well known metallurgist; C. H. Urquhart, formerly of Amadon and now superintendent of the C. O. D. mine in the Cerbat rang; W. P. O'Meara of Los Angeles, who mined a fortune from a lease on the Mizpah claim during the early days of Tonopah; and by John B. Tregloan of Alameda, former superintendent of the McNamara mill at Tonopah and later of the United Eastern mill at Oatman, Arizona.

Nevada is represented by Morris B. Dudley, formerly of Manhattan, who, with his associates has expended more than a million dollars in the development of mining proper-

ties in the country tributary to Kingman; Branch H. Smith, well known mine manager of Tonopah; Frank T. Torpey of Alameda, California; who is operating the Uncle Sam mine in the Eureka, Nevada district; Charles S. Sprague, managing director of the Jumbo Extension mine at Goldfield; C. A. Calhoun, a metallurgical chemist who was for many years connected with the prominent mining companies of Tonopah; J. P. Loftus, well known mine operator at Goldfield and Round Mountain; M. Page, successful leaser in several Nevada mining camps, and by J. K. Turner, the mining engineer who transformed the Jumbo Extension mine from a failure into a success.

Katherine a Bonanza Mine.

The bonanza Comstock lode, greatest of all silver-gold bearing veins, is represented by Charles Sutro of San Francisco. The name of Sutro is intimately associated with early day mining successes at Virginia City, Nevada, and it now appears as though it was to be quite intimately associated with the gold mining successes of the River Range country.

Charles Sutro and his associates have for a number of years been developing the Katherine property from a prospect into a mine. The degree of success they have attained is better understood when it is stated that the ore tonnage blocked out between the first and third levels of the Katherine mine has a value in excess of \$3,000,000.00, and that the ore exposed on the 400-foot level has a value fully equal to the ore exposed on the levels above. Plans are now being made to equip the mine with a more powerful plant of machinery, preparatory to sinking a shaft

to a depth of 700 feet and the erection of an ore reduction plant.

Charles N. Miller of San Francisco has purchased the Katherine Extension property and is preparing to open the extension of the rich Katherine vein. A two-compartment vertical shaft is being sunk for that purpose and has been equipped with hoisting and compressor plants. The strike of the Katherine vein is readily traced into Katherine Extension ground and is yielding good values where exposed at surface and nominal depth within the lines of the Katherine Extension property. Miller was one of the first to "pioneer" in the new district and is in line to open one of the big mines there.

Town of Katherine Now Building.

The camp of Katherine, recently established on the Katherine Extension property, is already presenting the scenes of animation that precede the rush to a new mining district. Streets have been surveyed and graded, and buildings are now in the course of erection at various points on the townsite. Business is in full swing in the open pending the completion of structures to house it, and is growing and thriving.

One enterprising resident has erected a tent restaurant and is already overcrowded with patrons. Another resident, fully as enterprising, is preparing to erect a bath house amid the arid sweet of the desert sand.

Yet another has ordered materials for a fireproof garage to house the score or more automobiles owned by the pioneers of the camp. "Tom" Devine, proprietor of the Beale hotel at Kingman, is preparing to establish a branch hotel in the new camp. The necessary furnishings have been ordered in Los Angeles by wire.

Last Saturday night the pioneers of Katherine officially "christened" their camp by giving a dance and supper in a newly completed building which, in the very near future, is to be utilized for the more prosaic pastime of dealing our flour, the sugar and the ham at so much per. The affair was attended by more than 200 people, and was graced by a warmth of hospitality and an unassuming courtesy to which more pretentious and fashionable gatherings are too often strangers. Among those present were men and women who have blazed mining trails from the African Rand to the Arctic Circle. Men and women to whom privation and physical discomfort are but a part of the Great Adventure.

Hon. Key Pittman, U. S. Senator from Nevada, spoke before the New York Section of the Mining and Metallurgical Society of America on April 28.

The coinage of a 2½-cent piece, bearing the likeness of Theodore Roosevelt, with the date of his birth and death, was provided in a bill introduced in the House on April 27th.

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Representative McFadden of the house banking and currency committee, has introduced his bill providing for an excise tax of 50 cents per pennyweight on fine gold contained in manufactured articles and for a premium of 50 cents per pennyweight to be paid to producers of newly mined gold in the United States, says a recent Washington dispatch. There does not seem to be as much need for the passage of a measure of this kind as there was several months ago. Gold mining and prospecting is being prosecuted with renewed vigor as it is.

TO OUR PATRONS AND READERS.

Owing to conditions resulting from the pending difficulties with the job printing, pressmen's and binders' unions this issue of the Mining Review is late. Our patrons and friends are assured that we shall issue as promptly as possible during the unsettled period now prevailing.

SENATOR KING'S "GOOD OFFICES."

According to Washington advices Senator William H. King, of Utah, is making an effort to have Congress suspend the law governing assessment work on mining claims for this year and last. He would exempt even those who have until June 30th to perform their assessment work for last year and also make it possible for them to escape this year's work, which must be performed by the end of the year. We fail to see the necessity for such relief at this time, and we believe the miners of the western districts—that is, the real, bona fide miners and mining claim owners—who are holding their properties for development purposes, rather than speculation, do not expect or seek exemption at this time.

Conditions which called for relief last year do not exist today. A great many claim owners last fall did their work under trying conditions rather than run the risk of not being granted the relief they sought, while a great many others have already done the required work for 1920 since the first of the year, and some of them are unquestionably continuing the work so as to cover this year's requirements at the same time.

It is desirable now that mine development and assessment work should be done, and there are any number of men available to do it. As we view the situation nothing can now be gained that will be of benefit to legitimate mining by granting further relief; such relief as Senator King is reported to be working for at this time would only AID and ABET that class which would hold mining ground indefinitely without other purpose than to profit through the sale of their locations by the work being done by neighbors.

It is important to the mining industry that everybody connected with it do something to build it up. Holding locations from year to year without doing any work upon them will only help to hold things back and retard the efforts of those who are striving to put new life into the metal mining regions of the west.

Senator King does—or should—know that as well as anybody. There has been much prospecting and much locating done

this spring in a number of western mining districts and, according to reports coming in, many important discoveries have been made and much work is still going on. This work should not be hampered and discounted by permitting "wildcatters" to hold ground on which they have no thought of ever doing a lick of work.

The legitimate prospector and claim owner today is not seeking charity or relief from physical effort, and this applies to the locator of oil shales, oil sands, etc., as well as to metal mining locations. What he wants is aid of capital to develop and make a mine of his ground. If he has ground worth having he will do his work anyhow. If he can interest capital he will endeavor to make it worth capital's while.

NEW MINING "BOOMS."

A well-meaning friend remarked the other day that he did not place much confidence in the reports coming from writers dealing with the mining activities, "finds" and "strikes" in different parts of Nevada, in Arizona and other portions of the great mineral-bearing regions of the west. Our friend belongs to a class of staid, upright, conservative, cautious citizens who never take the initiative in anything; who always have to be "shown"; who never see merit in anything previous to its complete demonstration. New camps, new strikes, new mines, new enterprises are never named after them; if the world's movement depended upon them it would stand still.

It is gratifying to note, however, that we have in the mining west a lot of red-blooded aggressive people who, when the clouds of adversity look most forbidding—when "everything goes dead wrong"—roll up their sleeves and go to work with a set determination to shake off lethargy and compel the world to "sit up and take notice."

In the latter class of people are included those who have been combing the western mining regions since the aftermath of the war began to paralyze the metal mining industry. They have been searching out silver and gold properties; they have been doing development work; they have been converting discoveries into mines; they have been locating and equipping placer deposits, building mills—some of them quite pretentious, at that—and they have been spending their money like princes.

Correspondents and special mining writers are now giving these activities and new discoveries publicity, and by so doing are helping to dispel the gloom and revive the mining industry. Investigation is invited by them; and competent engineers are beginning to report that there is much of merit in what they are writing about. And it is reasonable to expect that many investors with nerve and foresight will follow them into these new fields of rich possibilities.

How Present Freight Rates Cripple Utah Mine Operations

Writing to his "home-town" paper, Walter Fitch, president of the Chief Consolidated Mining Company of Tintic, says:

I have seen in your last week's Eureka Reporter the comments of Mr. Wild, Traffic Manager of the D. & R. G. railroad, on some remarks you had made in connection with the present extremely high and burdensome smelter and railroad rates, which of course are limiting the operations of mines in this section to a very alarming extent, and making the task of those that are running extraordinarily difficult and almost altogether profitless, except in cases where very rich ore can be shipped; but notwithstanding that these conditions undoubtedly exist I am of opinion that our cause will not be aided by subjecting either of the railroads or the smelters to any unreasonable attacks.

The present almost unparalleled business conditions are the result of the war, and the railroads and smelters as well as ourselves and all other business are suffering from greater difficulties than ever before experienced and we are all trying to survive them and to do the best possible for ourselves, our men and our communities.

In regard to the railroads and the smelters, the increased charges of the latter were brought about by increases in freight charges and wages, principally, and by far the largest factor in these were the freight charges. To enumerate these briefly they can be listed as follows:

Increases in Freight Rates—
June 25, 1918—25 per cent on ore, plus war tax of 3 per cent (coal and on all other commodities.)
June 25, 1918—Bullion rate from Utah to Atlantic seaboard raised from \$10 to \$16.50 plus 3 per cent war tax.
August 26, 1920—Same rate increased from \$16.50 plus war tax to \$22.00 plus war tax.
1916—The withdrawal of the "Releasing" privilege on the high grade ores, thus compelling a charge varying all the way from \$5 to \$9 per ton.

The several increases of freight rates compelled the smelters to increase their charges as each one occurred, with the result that our own costs for smelting, freight and sampling for the years 1911 to 1914 averaged \$8.45 per ton on our ores to the present rate of \$20.08.

There is no disputing these results. What we are now concerned with is as to how soon the railroads can commence to reduce these high rates that have slowed up all business. Whenever the reductions come then more ore will flow from the mines to the smelters, and the latter will get the supply they want to run efficiently and to reduce their costs of treatment and this in turn will give added stimulus to the mining of more ore.

The labor costs have been coming down but nothing so far has been contributed by the railroads towards the remedying of the great trouble and the whole country is awaiting their move.

All other lines of business have made adjustments of wages and restored their efficiency to greater or less degrees, and revised their costs and selling prices, with the exception of the melters and the railroads, and by far the greater sinner of the two is the railroad because before it moves in adjusting rates the smelter cannot.

We all know that this sin is an inheritance from the McAdoo administration or railroad management of the past few years and that it will take time to make full remedy possible; but in the state of Utah there are things that should be righted at once, and immediate improved results in the way of added business and income will at once inure to not only the mines and smelters, but to the railroads themselves, and the just thing to do, and that at once, is to reduce these ore rates to a proper equality with the rates on like commodities elsewhere in the country.

These extortionate rates of bygone days have got to go and we want the railroads to make these perfectly reasonable adjustments without compelling the mines to go to the Commissions for them as we had to do recently.

Average Raise On Chief Con. Ore.

69c per ton, and added approximately \$2 per ton to the smelter rates. Resulting increase in smelting from \$1.51 to \$1.87 per ton on different ores.

Resulting increase in smelting from \$1.43 to \$2.55 per ton.

This added about \$20,000 per year to the freight charges of the Chief Cons.

EXTENSIVE PLACERING OPERATIONS NEAR BONNER'S FERRY, IDAHO

Spokane, Wash., May 10.—Sidney W. Norman, recently returned from a several days' trip to the property of the Idaho Gold and Ruby Mining Company, near Bonner's Ferry, where sluicing operations began early this month following years of preparation. Proof of the value of the property still remains some months away, as the necessary concentrating plant to separate the gold and black sand has not been built. Regarding the present operations, Mr. Norman said:

"Three giants are at work on a high bar about 1,600 feet up stream from the flumes, construction of which has been practically completed. The two upper giants, working

under 250 and 110-foot head, have five-inch nozzles, while the lowest, operated from a point twenty feet above Boulder creek, is working under a 430-foot head. It is estimated that 2,000 miner's inches of water are being used in the giants and the surface stream brought over the ground, and upon that basis it is possible that as much as 10,000 cubic yards are being moved daily. Water has been turned into both the six-foot and twelve-foot flumes and the fine sands are beginning to collect in a 15,000-ton cement storage tank on the west bank of the stream and alongside the flume structure.

"The concentrating plant is to be equipped with Ogden modern tables and special gravity devices worked out by Assistant Manager S. A. Deardorff, and which will be built over the big flume structure, started at once, according to the management. The tables, for which the company owns all patent rights, are being constructed on the property and it is said the whole plant will be in readiness by July or August. The flumes are 300 feet long and constructed of cement and heavy timbers, apparently sufficiently strong to stand any strain that they may be called upon to bear."

HEADACHELESS BLASTING.

If you should ask a blaster what he considers the most objectionable feature connected with the use of dynamite he would no doubt answer, "the powder headache." This headache is experienced by practically all those who handle the dynamite and inhale some of the fumes evolved on detonation. Efforts have been made to avoid the headache by wearing gloves when handling the cartridges and by waiting until the "smoke" clears away after the blast, but almost invariably somebody becomes a victim of this peculiar sickness.

The western loggers and miners have welcomed with enthusiasm the recent production of a new explosive, the use of which does not cause headaches. Many of them have tested the powder and found that not the slightest headache results from handling the cartridges without gloves or from breathing in the fumes. Their reports also state, as an evidence of the power exerted by the explosive, that fewer of its cartridges are required to accomplish a successful blast than is needed with the use of ordinary dynamites. It can be seen that headacheless blasting is at last a reality.

Another important feature of this explosive is indicated by its name, "Giant Non-Freezing Stumping," which enhances its value to those concerned with cold weather blasting. The powder cannot freeze, regardless of temperature and never requires thawing. It is made from an entirely new formula and is regarded as the most notable achievement in the explosive industry since the discovery of "permissibles."

Opening Up Fine Property in Northern Elko County, Nev.

Judging from samples of ore recently displayed in this city by J. A. Palmer an unusually fine showing is being made in the Patterson group of mining claims in northern Elko county, Nevada. According to Mr. Palmer, who is manager of the property, a tunnel has been driven on none of the claims a distance of 140 feet and four feet of silver-copper-gold ore that samples about \$140 a ton, has been opened up.

In another tunnel, driven 160 feet to develop a silver-lead vein, streaks of fine ore in the nine-foot ledge give fine assays in silver and lead, while the mass, it is estimated, will carry values approximately \$50 a ton. The ore carries carbonates and galena and certainly looks fine.

The ores of the silver-copper-gold vein make in an iron-quartz gangue and samples

shown disclose streaks of silvanite, copper-iron sulphides and just recently thin stringers of native copper have made their appearance.

Mr. Palmer and his associates have eleven claims in their group which they have been developing and prospecting at various points for five years. A small shipment—four and one-half tons—made from the property a few months ago, returned the owners over \$600 from the smelter.

The property is located twelve miles northwest of Mountain City, Elko county. It is seventy miles from Elko and thirty miles due west of Jarbidge and, according to Manager Palmer, is in the same mineral belt that now is attracting so much attention to the Jarbidge mines.

HUNTINGTON WELL DRILLING HELD UP BY ACCIDENT TO RIG.

Operations are held up temporarily at the Ohio Company's test well in Huntington, Utah, where the hole is believed to be ready to enter the Ferron or first sands from which production may be had, due to a rig accident. Officials of the company are unable to say how long work will be delayed until the rig has been repaired. A rig builder was summoned from Wyoming to make the needed repairs.

From reports received it is understood that the "calf chain" which handles the casing, slipped or gave way breaking the calf wheel and dropping the casing which is in the hole. The "calf chain" is handled by the calf wheel. The string of casing in the hole, which is handled by the chain, is from 1,500 to 1,800 feet long and the casing weighs about forty-five pounds a foot, suspending considerable weight on the chain. When the calf wheel collapsed due to the mishap with the chain the casing may have been damaged by its drop, but its condition cannot be determined until the rig has been repaired so that the casing may be lifted. There is a possibility that some of the casing may have telescoped in the hole which would require a mean repairing job.

Reports from the well are that it is not believed the casing has been damaged.

The Huntington test is the first of the deep test holes now being drilled in the state expected to come in. It is reported to be slightly over 2,000 feet deep and geological reports are to the effect the Ferron or first objective sand should be encountered around this depth. The hole is now in shale believed to be overlying the sand.

WILL BUILD ELECTRIC RAILROAD THROUGH WYOMING OIL FIELD.

Unless some unforeseen difficulty arises, Casper will soon have an outlet both north and south with an electric railway, says the Wyoming Oil World of May 7th. The line will connect Casper with Rawlins to the south and Sheridan on the north and will be 250 miles in length. John Whalen of Casper was in Denver this week, where it has been announced that he signed a contract with the Natrona Power Company for water rights on the Big Horn river. The power company will build a big dam on the river to generate power for the entire line.

The south branch will be built first. It is about 125 miles in length and will connect with the Union Pacific line at Rawlins. It will pass through Whiskey Gap and the Lost Soldier oil field and will open up some of the best agricultural lands in the state.

The north branch will not be built for another year in its entirety. It will run from Casper to Sheridan, connecting two of the largest and most prosperous cities in the state and it will pass through Salt Creek. Because of the heavy freight traffic, the north branch may be extended as far north as Salt Creek oil field this year. Line will connect with Burlington at Sheridan and will cross Northwestern and Burlington at Casper.

Just how much this will mean to Casper, it is impossible to foretell at this time. It will also mean as much or more to the intervening territory. Such a project has been discussed for several years, but this is the first time it has gone beyond the conversational stage. Now that strong interests are behind the proposition.

UTAH OIL FIELD DRILLERS MAY PROFIT BY THIS STORY

Shreveport, La., April 28.—Most of the drillers quit too quick when they find salt water in a wildcat well. Stated briefly, this is the theory of W. A. Stephens, general manager of the Lakeside Oil Company's Bienville Parish properties, under whose direction the company's gasser, Bienville's first successful wildcat, was completed. Stephens declares that when he drilled into a sealed pocket of salt water at 2,514 feet all the scouts on the location spat with a disgusted finality and left, and the "big companies" carried Gidden No. 1 in section 16-16-10, on their field reports as a salt water well until the hole blew in with 10,000,000 cubic feet of gas with the drill pipe in the hole.

"I felt a little dubious myself when she headed thirty feet over the rotary as salty as army bacon," Stephens said, "but I bailed 'er and I bailed 'er until she was dry as a powder house, and I knew then I didn't have any natatorium."

"There is no casing or liner in the hole from 150 feet above the bottom for a simple reason that the well blew in before we were expecting it and we haven't been able to set since. When the salt water first showed in the ditch I decided on a test. We were at about 2,514 feet when I started washing and after pumping in the fresh water I ran the bailer top and bottom. The first bailer off the top was as salty as possible, old rusty salt water that had been there a long time. The bailer off the bottom came up full of the fresh wash water."

"When we showed headway against the water I knew then we had a sealed pocket, and no man can tell me there's no such thing as a sealed pocket of salt water. After we'd bailed a few times she made her head and a short while after she was dry as a bone and we resumed drilling."

"There's a test over across the lake given up as a salt water well. It may be, but I doubt it. Most men quit too quick when they find salt water. They don't bail long enough. If the water gains on the bailer, or the bailer is able only to hold a level against it then there's reason to give up the test as a natatorium, but not before."

—o—
This country needs more hands and fewer feet with corns on them.

—o—
Recent arrivals at Dawson from Keno Hill, in the Mayer district, confirm the report of the discovery of a nine-foot silver vein in the Rico claim here. The strike was made in a tunnel which pierces a 1,000-foot bluff and the center of the vein is said to be two feet of solid galena assaying more than \$200 to the ton. It is said to be the richest vein ever struck in the Yukon or Alaska.

Judge Mining & Smelting Co. Makes Good Showing in 1920

The annual report of the Judge Mining & Smelting Company for 1920 was issued from the press and mailed to shareholders a few days ago. Taking everything into account the exhibit made is a fine one. The report is issued under date of April 1st and the essential features of the year's business is covered in the introductory statement by General Manager G. W. Lambourne, as follows:

"The year 1920 started with a favorable metal market and continued satisfactory for the greater part of the year, and had labor been available and satisfactory, a full tonnage of ore would have been extracted. Later in the year when willing labor became plentiful, metal prices had dropped to a point where only the higher grade ores could withstand the cost of mining and marketing.

"The total output of the mine for the year was 41,316 tons of ore, of which 9,150 tons were of shipping grade. The metal contents of all ores sold were 483,890 ounces silver, 49 ounces gold, 7,877,121 pounds lead and 59,186 pounds copper. The Electrolytic plant produced 2,808,000 pounds premium grade zinc. Unsold products on hand January 1 were 1,414,100 pounds premium zinc and 1,033 tons zinc concentrates. At this date 838,100 pounds of the premium zinc have been sold at an average price of 7½¢ per pound.

"In May your company joined the Daly-West Mining Company and the Park Utah Mining Company (both closely allied with the Judge Mining & Smelting Company) in the purchase of the controlling interest (i. e. 6,000 shares) of the Daly Mining Company, and is now the owner of 17,000 shares.

"The developed property of the Daly Mining Company is located between the Ontario Silver Mining Company and the Daly West Mining Company, separated only by vertical lines of segregation across the strike of the veins. In addition to its productive mining property, the Daly Mining Company is also a large owner in the principal drainage and transportation tunnels of the district, and a three-sevenths owner in a developed coal mine at Coalville, Utah, about eighteen miles from Park City. Ownership of the controlling interest in the Daly Mining Company adds much to the safety and economical operation of all Judge allied companies."

The financial statement shows that the year began with a balance on hand amounting to \$148,385.43. Receipts from sale of crude ore and concentrates totaled \$675,377.19, and from the products of the electrolytic zinc plant \$293,445.68, which, with interest and sundry receipts of \$15,801.57, made up a total of cash resources amount-

ing to \$1,133,309.87. Total expenditures for the year, including \$180,000 in dividends, \$55,250 on property purchase account, \$287,619.22 for mine, mill, zinc reduction, ore expense and prospecting and dead work accounts, as well as enumerated general expense accounts, amounted to \$1,072,003.36, leaving an available balance at the first of the present year of \$61,306.51.

Since incorporation the company realized from the sale metals mined and shipped a total of \$11,018,630.07, while the total dividends disbursed amounted to \$2,550,000.

COLONEL D. C. JACKLING SAYS BUSINESS WILL MEND.

Colonel D. C. Jackling, managing director of the Utah Copper Company and the other so-called Jackling porphyries, arrived in Salt Lake from a business meeting of his associated companies in New York, on Thursday of last week and continued on his way to San Francisco on Saturday.

"Of course, there remains some uneven spots to be ironed out," Colonel Jackling stated when interviewed on the situation existing today, "but I hope and anticipate that the process of readjustment will continue in an orderly manner and that within a few months and before the end of the present year the general business of the country will have returned to something near what might be termed the normal.

Optimistic Regarding Future.

"In retality, I am quite optimistic over the outlook. The turn certainly has been made, and, while the process of recovery has been and probably will be slow, there can be no question that the worst is now a matter of history.

"While the settlement of the reparations question, which now seems assured, will have a beneficial effect upon the general situation, the mere settlement does not mean the financial squaring of the account. It will, however, constitute what might be termed the sub-basis on which the world in general will be able to figure on the future in a business way.

Normal Consumption Would Soon Wipe Out Copper Stock.

"I believe, however," he said, "that the worst has been experienced in respect to the copper industry. Should consumption reach the average of the past two years the visible supply of copper would become exhausted within six months.

"It certainly is the hope of the management of the Utah Copper and associated companies that before the end of the present year conditions will be such that it will

be necessary to resume operations at least in part."

MINE & SMELTER SUPPLY CHANGE.

A change has taken place in the management of the Mine & Smelter Supply Company, Mr. W. L. Loveland, who has been general manager of the company for the past twelve years, having resigned and Mr. H. J. Gundlach appointed his successor.

The Mine & Smelter Supply Company operates large stores and warehouses at Denver, Salt Lake City and El Paso, and has offices at New York City, Chicago, San Francisco and Mexico City. They are also exclusive manufacturers of the well known Wilfley table, Marcy ball mill and Marcy roller mill.

The company does an extensive business in the sale of heavy machinery throughout the world, but their greatest business in volume consists in the jobbing of mill supplies, electrical apparatus and supplies and assay and chemical supplies. Large and well balanced stocks of these commodities are maintained at Denver, Salt Lake City and El Paso.

Mr. Gundlach entered the employ of the company in 1911 and for many years was manager of the Electrical Department of the Denver store, which was built up under his management from an unimportant branch of the business into one of the main departments. For the past year, Mr. Gundlach has been manager of the Denver store.

Coal Notes

Price (Emery County) Sun, April 30

W. H. Lawley shipped two cars of coal last week from his Hardscrabble mine to Zion. It was loaded at Martin.

The grading of the Utah Terminal railway through Storrs and Standardville is expected to be completed in about ten days.

Kinney Coal Company at Scofield is working two and three days a week at this time.

W. D. McLean of Salt Lake City is doing some development work on his properties up above the Mutual. He uses the latter's tippie.

Robert Howard, superintendent up at Peerless, was down from that camp last Wednesday. The mines are working one day a week and sometimes two.

Utah Fuel Company miners are getting about three days a week on an average at Clear Creek, Winter Quarters and Castle Gate, and four and five days at Sunnyside.

United States Fuel Company camps in Carbon and Emery counties are averaging about two days a week at this time. The same with the camps up Spring canyon and at Kenilworth.

Oil Development Possibilities Near Delta, Millard County

Delta, Utah, May 10.—F. L. Byron, an old-time oil prospector and resident of this place, who has been engaged for the past several weeks in looking over Millard county for petroleum indications, had this to say with respect to results of his investigations:

"To begin with, this valley lies in the Tertiary formation and while this formation is not the greatest producer of oil in the United States, it nevertheless does produce more than half of the petroleum of the world. I find that oil seeps in domestic water wells are of common occurrence in many localities that I have visited. I have been informed by two prominent water well drillers who have had wide experience in drilling for water in this vicinity that they have found oil at depths ranging from 380 feet to 700 feet, and in one instance a well had to be abandoned for domestic purposes on account of oil and gas.

Oil in Springs and Water Wells.

On the eastern rim of the valley where the monoclinical structure flanks the mountain range there are to be found springs with unmistakable oil seeps. In this vicinity, between Holden and Fillmore, some desultory efforts at drilling for oil have been made during the past fifteen years. Little information can be had regarding the log of these wells, but from what I gather they were all shallow wells, some five or six in number, and none could be regarded as a test well.

"Some fifteen years ago a state appropriation was made for the purpose of drilling for artesian water flows in Millard county. A site was selected on a farm owned by H. Stevens, situated four miles west of Fillmore and a well was put down to a depth of 700 feet. No water flow was struck, but I have it from James A. Melville, a well known banker and capitalist of this county who was connected with the management of this well, that petroleum of good quality but small quantity was struck.

One Standard Rig Well is Capped.

"About three years ago a close corporation came in with a standard rig and put down a well on this same site, starting with a twelve-inch hole. As to what depth was attained or what results were accomplished I was unable to learn, although I asked the manager, who is still in Fillmore. He said he was not permitted to give out any information regarding the well, as his company was desirous of getting enough leases to justify a test well drilling campaign on broad and comprehensive lines. However, this gentleman did volunteer the information that his people, in the event of oil being found in commercial quantities, was ready to construct a pipe line from Utah to San Francisco.

"This well site is on 'pretty structure,' situated as it is on a low dome about three-fourths of a mile long and a half mile wide, sloping to the east and to the west, while on the north and the south it intersects an anticline at right angles. These anticlines rise to a height of from 500 to 800 feet above the surrounding terrain. The standard rig is still on the ground and the well is capped.

Oil Indications Are Numerous.

"One familiar with the oil game can not go about in this great valley, which is 120 miles long by fifty miles wide, without being impressed with its possibilities as an oil field—with its immense gypsum beds, chalk beds, salt deposits and sulphur springs—all of which are regarded by some of the foremost oil geologists as being the end products in nature's process in the making of petroleum.

"This valley, for the most part lying as it does in a high state or original repose with occasional low upfolds and gentle anticlinal ridges running from one to five or ten miles in length, surrounded as they are by great areas of nearly level terra, affords a broad subterranean base for the oil to gather into the structure.

"From these indications and conditions, and the absence of great faults on the one hand, and with no great river escarpments to cut the oil measures and denude the oil sands, making a possible escape by seepage ages ago, it would seem that the oil must be with us still. It therefore seems to me that intelligent effort in the development of this field should bring substantial and profitable results."

OIL SHALE LAND EVALUATION.

By James M. McClave.*

During 1920 there was considerable activity in the sale of oil shale tracts to large oil concerns and also to investors who believe that the shale deposits of this country will give rise to an important industry. Large tracts of shale land have been taken over as an investment by some of the great manufacturing corporations. Investigations before purchase, so far made by engineers of these corporations, have had to do chiefly with accessibility, transportation facilities, good water rights, and locations for retorting and refining. Very little attention has been given to the grade and character of oils contained in the shale.

The prevailing opinion of the general public has been that the great shale deposits in Colorado and Utah are fairly uniform in grade and that they contain a much higher per cent of oil than the shales of Scotland. However, this is not the case.

*In Mountain States Mineral Age.

as the government reports by Dean E. Winchester show total oil contents ranging from forty to ninety gallons of oil per ton of shale, and ammonium sulphate from less than one pound to 12.5 pounds per ton.

Very little attention has been given to analysis by stratification and to the grade and character of oils and by-products in the various strata and formation. Samples have been taken at random from open cuts on the side of mountains or from shale cliffs where only the lower strata could be sampled, and these samples have been estimated to represent the general character of the entire deposit of that particular section.

But in some cases engineers investigating shale deposits for large corporations were not satisfied with the method of general sampling. A number of careful examinations were made where the shale beds were exposed in ravines and canyons in such a way as to reveal to good advantage the various strata of formation. It was found that there are well defined strata showing different colors and texture of shale, the strata ranging from five to twenty-five feet in thickness. These were carefully sampled and tested for their total oil content and then fractionated for gasoline, kerosene, gas, oils, light and heavy lubricants and for by-products.

The total oils from ten well defined strata ran from six to ninety-three gallons per ton of shale, and from two to twelve pounds of ammonium sulphate. When the oils were fractionally distilled the fractions varied considerably with the shale strata, resulting in a great variety of products. Some were very high in gasoline and low in lubricants and residuums. It was also found that some of the strata contained oil that was comparatively easy to refine for the low boiling oils into marketable products.

Many of the strata show a great variety of products in the heavier oils that will require special refining in order to yield marketable products.

The sampling of the strata show clearly that there are certain portions of the shale beds too complex and low grade to handle and that other well defined strata can be worked commercially. With a survey of the land, and the value of the strata definitely determined it is not difficult to make a conservative estimate of a given deposit. During the past three years many transfers of shale land have been made on location certificates, with no description of property and no investigation as to grade and character of oils.

As a result of this analysis and evaluation of shale deposits by strata, investors are becoming more particular and insist on knowing something about the amount and value of oil and by-products contained in their prospective purchase, as well as location, accessibility, physical conditions, water rights, and nature of assessment work. Shale lands with proper credentials are much in demand.

Some Principles Governing Production of Oil Wells

The United States Bureau of Mines announces the publication of Bulletin 194, "Some principles governing the production of oil wells," by Carl H. Beal, formerly petroleum technologist of the bureau, and J. O. Lewis, former chief petroleum technologist.

The bulletin discusses some of the fundamental factors governing oil production, taking up first the conditions affecting the amount of oil in the oil sand, then those factors that control the rate of production of oil wells, and finally discussing several related problems, most of which deal particularly with the effect of the production of one well on that of another.

The subjects covered include porosities of oil sands, ultimate production of recoverable oil, the percentage of oil recovered from oil sands with present-day methods, the effect of geologic structure and rock pressure and depth on ultimate production, well spacing, water conditions, factors governing the decline of oil wells, the policy of drilling to maintain production, considerations on "flush" and "settled" production, etc.

Life of Oil Well Important.

A knowledge of the length of time a well will produce oil is of importance to the oil operator, says the bulletin. Not only does such knowledge make it possible to charge off on a sounder basis the depreciation on capital invested in physical property, but it also provides information for making depletion deductions on account of the progressive exhaustion of the oil resources, and gives the operator a working basis for the proper management of his property.

The life of an oil well may range from a few months of very high or very low productivity to many years. In some of the Appalachian fields the average daily production amounts to only a few gallons and the well is pumped not oftener than once a week. In the Gulf Coast field the lives of oil wells associated with the salt domes are, as a general rule, very short. The average salt dome well has a productive life of not to exceed two and one-half or three years.

Small holdings in an oil field are a potent factor in shortening the lives of the wells for the reason that line drilling is forced and operations are not carried on in the most workmanlike manner, thereby permitting incursions of water and the waste of gas pressure.

The Healdton, Okla., wells, as a rule, were rather prolific and all had fairly high initial production. The great fault in this field, however, was the close spacing, owing to small holdings, which caused a very rapid reduction of gas pressure.

Important Factors Noted.

Probably the most important of the factors that tend to cut off or to prolong the life of an old well is the net value of the oil to the producer. When the well declines to a small daily production and this margin becomes very narrow, a slight increase in price will cause a corresponding increase in the margin, and the life of the small well will be greatly extended thereby.

An increase in the price of oil may make possible the cleaning out of the well, the extraction of thousands of barrels of oil from it, and add many years to its life. The exhaustion of a property or a well does not necessarily mean that all of the oil has been withdrawn from the productive sand, but rather that the property can no longer be operated at a profit. Absolute exhaustion of the oil in a sand is impossible, and the life of a well is, therefore, mostly a relative term.

In 1915, when the price of oil in Oklahoma was 40 cents per barrel, wells were abandoned before they reached one barrel daily, but at the present higher price many of the wells can be pumped to a few gallons daily before abandonment. Many production records in the Bartlesville and Nowata field, Oklahoma, show wells that have produced for thirteen years and are still averaging two or three barrels daily.

Average Life of Wells.

Assuming, however, that all wells are abandoned at the time they reach a production of one barrel daily, the wells in the field of Oklahoma have an average life of two to twenty years. It is true that the wells in some localities will be abandoned much earlier. Many of the wells drilled to the Wheeler sand in the Cushing field, for example, were abandoned a few months after their completion. The lives of the shallow wells in southeastern Kansas would be very short if cut off at one barrel daily, but on account of the low operating cost the wells are being pumped to much smaller amounts. As a general rule, the wells in the fields of north Texas and Louisiana, except Ranger district, will produce for fifteen or twenty years before they reach one barrel daily. In Illinois and in southeastern Ohio the average life is ten to fifteen years. In California the productive horizons are thick and the gas pressure is usually high, so that the wells producing under these conditions probably will not reach the minimum production for twenty or twenty-five years.

According to the 1920 census, there are only 333,000 cooks in this country, not counting cooks by marriage.

NEWCOMER'S "THIRD DEGREE" AT SILVERHORN BADGER FIGHT.

Silverhorn, Nev., May 10.—Silverhorn has come to stay. This is certain, judging from the success of the badger fight pulled off last Saturday. Everyone is agreed that it is an omen that assures the success of the newest Nevada silver camp.

For three days strenuous efforts had been made to trap the big badger whose berth had been located below Weir's Peak, and at last the wily animal was trapped and confined in a big strong box, ready for the fray.

More than 200 people, notified of the expected event had gathered on Main street while many others lined the hillsides. Three dogs had been entered by their owners for the fight, but a fierce black Airedale was unanimously chosen to start the fracas, the other dogs to be held in reserve. Betting was heavy and the whole camp was tense with barely subdued excitement as the dogs, eager for the mix-up, strained at their heavy leashes.

A number of applicants wanted to unloose the badger, but nearly everyone, having bet money on the outcome, was disqualified. The Newcomer, anxious to mix in, expressed his willingness to do the job, somewhat reluctantly it is true, as he naturally felt the heavy responsibility entailed—his word would be law and thousands of dollars were up on the outcome.

Bravely he pulled the heavy chain, releasing the badger—and swiftly he ran down the slope. It took real bravery to turn at last, battered and bruised, to face the tangled broken mass of crockery and dogs and the roar of applause from the encircling crowd. The Newcomer had taken the third degree of the Order of the Golden West.

PROMINENT GEOLOGIST LIKES SILVERHORN CAMP.

H. A. Titcomb, one of the more prominent geologists of the country, has departed for his home at Palo Alto, California, according to the Pioche Record. Mr. Titcomb has given considerable study to the ore occurrences at Silverhorn, and to the general geology of the district. He expects to return shortly to the camp, and to complete his general reconnaissance work. Mr. Titcomb stated that the geology of the district was one of the most interesting that he had ever seen. He was greatly impressed with the size and character of the deposits at Silverhorn. He mentioned particularly that any kind of rock a person could name seemingly existed in the district. Mr. Titcomb's presence in camp resulted in a great benefit to many of the operators, as he was ever willing to give his advice, which in all cases when followed out has been found of greatest value.

Live-Wire Notes From Camp of Silverhorn, Nevada

(Pioche Record.)

The restaurant at Silverhorn has increased its quarters to accommodate the increased volume of business.

Two barber shops will be established at Silverhorn as soon as lumber arrives for the buildings which they will occupy.

Clyde West of Pasadena, and part owner of the Silver King mine is in camp, and has secured interests in the new district.

The dance hall which is being moved from Ely to Silverhorn is arriving in installments, by trucks. This should soon be completed.

Herman Tietz of Ely, Nevada, is in the district for Ely interests, among whom are Jack Croutzer, former manager of the Northern hotel.

Mr. Hagans from Ely is going to put in a shoe repair shop. Arrangements for leasing a piece of ground from the Nevada Silver Horn for a building has been made.

About seven and a half miles southwest from Silverhorn there was just discovered a silver occurrence which has caused a small rush and the resulting staking of all the ground in the vicinity.

On the evening of the 20th there was staged in the main street a broncho-busting. This caused considerable excitement and a diversion from the topics of volumes of ores, porphyryless replacements, etc.

At Sunnyside there was a dance on the evening of April 16th. A number of people went from Silverhorn, among whom were Mrs. Frank Crampton, Miss Edna McCally, Mr. Ernest Godbe, Mr. J. C. Wier.

Upon the Silver Dale property a number of improvements and additions have been made. A large and spacious blacksmith shop was completed several days ago. Other buildings are being built upon the Dale property.

O. A. Kimball, one of the best known practical mining operators in Nevada, and who lives at Tonopah, arrived at Silverhorn on the 21st. He represents Tonopah interests and expects to make a rather detailed study of the camp.

Mr. Ryan from Ely, Nevada, is in camp and arranging to take contracts and investigating leases. The policy of the companies as regarding leases is not entirely clear. A number have desired leases, and it is expected that there will be a number of leases scattered over Crampton Hill and Weir's peak.

A party came from Tonopah on the evening of the 20th and with them a Mr. Weir. A dance was on at the camp, and to the sur-

prise of those present Mr. H. E. Weir who is in camp met his cousin whom he had not seen for fifteen years. Silverhorn is becoming the meeting place of men from all over the country.

Mr. Pitts, who has started the store at Silverhorn, has had so much business that he is already planning extensive enlargements, and these include a larger force to take care of the customers. In order to handle the large amount of freight which is coming from Pioche to the store Mr. Pitts expects to purchase this next week a large truck to keep in supplies.

J. Nelson Nevius, of Pasadena, California, arrived at Silverhorn on the 20th. Mr. Nevius was formerly geologist with the New York State Geological Survey, and is one of the best known economic mine geologists in the west. Mr. Nevius was formerly connected with the Vogelstein interests, and for some considerable time represented the chamber of mines and oil of Los Angeles.

One of the most important features of the camp is the opinions of all visiting engineers that it will not prove a one mine camp. The properties which possess showings wholly worthy of development and work upon these will start just as rapidly as material and equipment can be secured. A number of these have already been financed and have funds in the treasury ready to start work. Orders have been placed for material.

A petition was passed around for a post office a few days ago. Eighty-one names were secured within a few minutes, and many of those present never had the opportunity to see the petition let alone signing it. The question of taking emergency measures for the immediate establishment of a post office has been taken up with Congressman S. S. Arentz, from Nevada, Senator Lodge of Massachusetts and Vice President Coolidge, who evidenced marked interest in the rapid growth of the new boom silver town.

Ore body on Wier's Hill has been developed for over thirty feet. Samples taken by Thomas H. France, and also by a number of other parties show that there exists upon this new discovery a body of silver ore which in itself should be responsible for commanding the attention of the country. Plans for the development of this new showing are being made, and it is wholly probable that an adit tunnel will be run from a low point upon the hill in the gap between Wier's Peak and Crampton Hill, where a depth of over 150 feet can be obtained.

RESEARCH FELLOWSHIPS, UNIVERSITY OF IDAHO.

In co-operation with the United States Bureau of Mines and the Idaho Bureau of Mines and Geology, the University of Idaho offers in the School of Mines a number of fellowships. These fellowships are open to college graduates who have had good training in mining, metallurgy, or chemistry, and who are qualified to undertake research work.

The income of each fellowship is \$750 a year for the twelve months beginning July 1st, 1921.

Fellows will register as students in the University of Idaho and become candidates for the degree of Master of Science in Mining or Metallurgy (unless this or an equivalent degree has been earned.) Their class work will be directed by the heads of the departments of instruction, but the greater portion of their time will be spent in research work under the direction of the Bureau of Mines staff resident at the University. The purpose of this work is to undertake the solution of definite problems confronting the mining and metallurgical industries of the state of Idaho. For 1921-22 the following subjects are being considered.

(1) Flotation—with especial reference to differential separation of various minerals.

(2) Treatment of the complex zinc-lead ores of the state.

(3) Ore Dressing problems.

(4) Mining problems.

Application, with certified copy of collegiate record, statement of professional experience, and names and address of three references will be received up to June 1, 1921. The applications should be addressed to Francis A. Thompson, Dean, School of Mines, Moscow, Idaho.

PERSONAL MENTION.

L. D. Ricketts has been visiting the Inspiration mine, at Miami, Arizona.

A. V. Udell, of San Francisco, is visiting the principal zinc-smelting districts, including Utah.

Charles Butters is expected in New York from Nicaragua, where he stopped on his return from Chile.

W. G. Anderson is now mine superintendent for the Dolores Mines, near Madera, Chihuahua, Mexico.

J. C. Dick, the well known local mining engineer, has formally announced his resignation as chief of the natural resources subdivision of the income tax unit at Washington, to resume his practice of consulting mining engineer, with offices at 1502-3 Walker Bank building. Attention will be given to the technical questions in the federal tax law involving valuation of mines and other natural resources as applied to invested capital and depletion deductions.

Comstock Lode Activities Being Constantly Expanded

BY AL. H. MARTIN

With wide-flung explorations and developments rearing a base of substantial merit the world famous Comstock Lode again holds the center of interest in Nevada. Upward of 600 men are employed in the properties tributary to Virginia City, with this force being steadily increased and new companies constantly entering the famous field. Development of new and promising territory, including opening of old workings closed to mining for forty years, is progressing in the Consolidated Virginia, Ophir and other old properties on the North End, while the Middle Mines Association, Comstock Leasing and other strongly financed corporations are energetically developing the Savage, Bulion, Chollar, Hale & Norcross, Gould & Curry, and other famous producers composing the Middle portion of the Lode.

From the noted old Chollar, which has been producing constantly for nearly sixty years, eighty tons of commercial ore are going daily to the mill of the Comstock Leasing Company. Ore is also being milled from the Hale & Norcross and Potosi, with opening of new ground yielding satisfactory results. Toward Gold Hill the United Comstock is rejuvenating the Imperial, Confidence, Knickerbocker, Yellow Jacket and several other mines, and has completed plans for early construction of a cyanide mill for 1,000 tons daily capacity.

The zone of activity has broadened to the Brunswick Canyon, Dayton, North Carson, Silver City and other adjacent fields, with some of the leading mine operators of Nevada interested. Dollar silver has given a mighty impetus to rejuvenation of the Comstock Lode region, and recent developments have proven that much rich ore remains in the old producers, and that the virgin areas promise to be as richly productive as the older sections.

Goldfield Holds Out Great Promise.

Goldfield interest has centered on the long crosscut being driven from the 450-foot level of the Merger shaft by the Kewanas company. The crosscut is expected to intersect the St. Ives vein within two weeks, although heavy ground is impeding progress and compelling close timbering. It is positively known that on the 350 level of the St. Ives bonanza ore was left by leasing companies, but caving ground prevented extraction of the material at termination of the leases. In some workings ore assaying \$2,000 per ton was left, and it is this grade of material that the Kewanas company expects to open at a depth of 450 feet.

As soon as the objective is gained a sta-

tion will be cut, raises driven to the 350-foot horizon, and a campaign of comprehensive development instituted. The St. Ives mine forms a part of the Goldfield Deep Mines estate, but the section under development is held under a five-year lease by the Kewanas company, with the Deep Mines to receive a large royalty on gross earnings.

Goldfield Deep Mines has announced that the erection of the 250 horsepower Merger hoist over the three-compartment shaft will take place before the end of May. The shaft has a present depth of 480 feet and upon reaching the 800-foot level the surface hoist will be moved to this point and operated in conjunction with the powerful Merger hoist, which has an effective working depth of 4,000 vertical feet. The shaft has dimensions of five by seventeen and a half feet and is advancing at the rate of four feet daily.

At an approximate depth of 1,000 feet the shaft is figured to cut the C. O. D., Gold Bar and Victor veins, all of which yielded rich ore in the upper workings of the C. O. D., one of the properties comprising the Deep Mines group. While lateral developments are being prosecuted at this depth the shaft will be continued to the 2,400-foot level to reach the Florence-Goldfield Consolidated ore channel.

Strike Conditions at Tonopah.

For nearly a month every mine in the Tonopah-Divide districts, excepting the West End, Halifax, North Star and Divide Extension, has been closed as the result of a strike, following a reduction in wages of 75 cents per day. The employees have formed the Mineworkers' Association, and notified the operators that the organization must be considered in all matters relating to wages in the field. Neither side has made any move to settle the trouble. The strike is of passive character, with no attempt made to prevent men from seeking work at any of the mines.

The operators claim that in view of the reduced living costs the wage cut was justified. The workers counter with the assertion that living costs have not declined in Tonopah, and that in many instances rents, board, and price of commodities have been increased. It is an undeniable fact that living costs in the field are very high. State Labor Commissioner Frank W. Ingram is investigating the situation by request of the business interests.

Louisiana's turpentine and rosin production is worth from \$65,000,000 to \$75,000,000 a year.

LEESBURG GOLD DUST CO.

NEARLY READY TO START MILL

Orion E. Kirkpatrick, general manager of the Leesburg Gold Dust Mining Company, operating about one and one-half miles out of Leesburg, Idaho, announces that as soon as weather conditions will permit, he will place the company's fifty-ton cyanide mill in commission and begin the production of gold on a scale which he is confident will soon reimburse the present backers of the proposition for the faith they have shown and the money they have spent in rounding out the enterprise. The mill on the property was revamped and made practically ready for operation last year and Manager Kirkpatrick, who has been in Salt Lake for some time past awaiting the opening of spring, stated a few days ago that the small amount of additional equipment required to finish the mill would be shipped and hauled to the property just as soon as the roads were clear of snow on the mine end.

Since the reorganization of the old Gold Dust Company, which never got farther than to demonstrate that its property was a valuable one, Mr. Kirkpatrick has added two additional groups of claims to the new company's holdings and performed a great deal of development work of a substantial and telling character. In the carrying out of this campaign he has had the unstinted backing of E. W. Estifel, of Wheeling, W. Va., who personally owns a large majority of the company's stock and whose holdings with those of Mr. Kirkpatrick, constitute, it is understood, more than eight-tenths of the stock holdings.

"Thousands of feet of development work have been done on the properties," said Manager Kirkpatrick in discussing the company's outlook the other day. "The veins have been opened up and proven for a distance of 3,000 feet through the company's ground. Great masses of ore which, conservatively estimated, will mill better than \$5 a ton, have been opened up ready for extraction and treatment. In addition some of the workings are capable of yielding much ore that will run several times \$5 per ton, and it is this higher grade ore which we intend to begin treating this spring.

"The chief backer of this undertaking, Mr. Estifel, has never for a moment wavered in his determination to make a dividend-payer of the Leesburg Gold Dust, and I am now anxious to demonstrate to him that his confidence in the worth of the mine has not been misplaced and that he is entitled to a return of the money invested as soon as possible.

"I expect to make a good showing during this season's run, and when we get down to handling the average grade of ore I hope to add to the mill's capacity and treat several hundred tons of ore a day instead of fifty. We have been developing for four years now, and the mine is opening up bigger and better as the work progresses."

Around the State

With the payment on May 2 of the second quarterly dividend of 5 cents of the Chief Consolidated Mining Company for 1921, the disbursements will bring the grand total of dividends paid by the company to \$1,959,929.87.

Workmen on the 1,800 of the Ontario last week uncovered a vein of ore that has the ear marks of developing into a big body of first class. The find is very gratifying and has the promise of an important strike to those in charge.

Phil Purdy and associates, who are developing a molybdenite property near Delta, Millard county, are reported to have made a strike of six feet of molybdenite ore that will concentrate into a 30 per cent product. Six men are employed at the property.

Approximately 150 employees of the Utah Copper Company were laid off with the beginning of the month of May. At the present time the company has employed about 150 men in the work of maintenance at the mine and the various other plants.

The American Smelting & Refining Company has employed at this time about 350 men at its Garfield plant. J. M. Bidwell, general manager, said he did not expect that the smelter would shut down, as enough ore is being received from outside points to keep this number of men at work.

High grade ore is being shipped from the Quad Metals mine, near Frisco, according to Manager Grant Snyder. The carload last shipped, carrying a value of nearly 100 ounces of silver to the ton and 48 per cent lead, netted the company \$2,700 for twenty-seven tons, said Mr. Snyder. Another car shipped previously netted the company \$1,850 for a smaller tonnage. This ore is being taken from a winze sunk from the 700-foot level, the lowest working in the mine.

Conditions in the Gemini mine are entirely satisfactory as far as the ore deposits are concerned, according to Manager Jackson C. McChrystal. Some new ore is being opened from month to month and only recently what may prove to be a very important strike was made by one of the lessees. Mr. McChrystal believes that the mines of Tintic district have about passed the most critical point in the general depression and that any change will be for the better. His company hopes to go ahead without serious interruption.

Chief Consolidated Mining Company, operating at Tintic, earned net profits of \$45,064.24 during first quarter of 1921, according to the company's quarterly report just issued. After payment of dividend No. 27, disbursed during the quarter, \$862.64 was left for surplus account, which was increased to \$1,642,572.24. Production for the quarter was 5,562 tons of silver lead ore and 15,

592 tons of dry ores, a total of 21,144 tons, from which net profit, after payment of all charges, was \$42,012.62, balance of earnings for the quarter were from interest on investments and deposits.

At a meeting of the shareholders of the Eureka Metallurgical Company, held at Eureka, Tintic, on April 28, matters pertaining to the option on the control of the stock, held by John Hays Hammond, were discussed and by unanimous consent of all present this option was extended three months, dating from April 29th. Mr. Hammond has already assisted the company to a great extent, advancing money for the development of the milling processes which have been worked out by R. V. Smith, former resident of Eureka, and in securing the necessary domestic and foreign patents.

In Nearby States

ARIZONA.

Oatman produced over \$3,000,000 in gold in 1920 and they will beat those figures this year. Here, in a few acres of ground, they have taken out close to \$18,000,000 to date.

The plant of the Verde Mines and Milling Company, situated south of the Shea and Copper Chief mines, near Jerome, will soon be operating ten additional stamps, according to William F. Burns, president of the company.

The U. S. Smelting officials are inquiring from Oatman about prices of material and labor. No doubt they are figuring on starting up the Gold Roads mine. There they have a big mill and usually employ about 150 men, only a couple of miles from the United Eastern.—Oatman Mining News.

E. W. Brooks, one of the best known mining engineers in the west, visited Oatman in company with James Moss of Santa Barbara to examine the property owned by the Oatman-Eastern, close to the Tom Reed and adjoining the Telluride. Mr. Brooks will make a comprehensive report on the property with a view of laying the foundation for extensive development.

COLORADO.

Work is progressing at the new steel structure for the flotation unit of the Smuggler Union Company at Pandora. Steam pipes have been laid down for heating purposes and machinery is being installed.

The development of the Toltec vein, owned by the United States Mining Corporation, continues to be highly satisfactory, according to Silverton advices. A total of 318 feet of drifting has been done on the vein since it was cut last fall. The ore body is a large one, over forty feet in width, the values satisfactory at all times. The crop-

ping on the surface indicates an ore shoot some 600 feet in length, the present work has proved over one-half of the surface showing.

The Gold Crown mill, which lies within the city limits, just below Ouray, will be operated this summer. So states Frank E. Henn, who has just returned from a conference with his associates at Delta. They plan to first run upon ore already at the mill and to follow this run by others from ores near the mill.

IDAHO.

Work will be resumed on the Eagle Mountain Company's property in the near future. The mine is located on the Idaho-Montana divide, east of Burke.

The National Copper Mining Company, in the Coeur d'Alenes, has a crew of men at work cleaning out the lower tunnel, where a bad cave occurred last winter.

Reports from Mullan are to the effect that many of the lessees at the Hunter mine are finding large pockets of high grade silver ore in the old workings of the mine. Several carloads have been shipped from these leases with satisfactory results.

One shift a day is driving a crosscut from the bottom of the incline shaft in the North Bunker Hill mine in the Coeur d'Alenes. The crosscut is to locate a ledge which the company hopes to strike in about forty days. Work is progressing at the rate of five feet a day.

A new power drill has recently been purchased for the Clorinda mine near Clark's Fork for tunnel work. The life of one of these drills in the Clorinda formation is nearly 1,000 feet, the one being discarded having done 930 feet. The company expects to strike the big vein in about 400 feet more of tunnel, when it will be ready to ship. It is understood that the Lawrence mine in the same district, will soon resume work.

A two-cent dividend on Marsh stock, payable June 20 to shareholders of record on June 10, was declared by the newly elected trustees of the Marsh Consolidated Mines Company recently. This will amount to approximately \$40,000 and will leave in the neighborhood of \$50,000 in the company treasury for development work. The last year's officers were re-elected. Edward Pohlman, president; J. V. Pohlman, treasurer; Joseph McCarthy, secretary, and F. Cushing Moore, trustee, all of Spokane.

Machine drills are in operation on the Lookout Mountain property on Pine creek, near Kellogg. Installation of power was completed recently and active development work started. The drills are in use in the lower crosscut tunnel, which has been extended 435 feet toward the ledge on the 300-foot level. With the new equipment four feet of ground can be broken per shift and

rapid progress made in extending the cross-cut to the vein on this level. In the upper workings the Lookout vein disclosed a strong showing of lead-silver ores, in carbonate form, across a 25-foot ledge, and to reach this at greater depth the present tunnel was started.

The Alhambra concentrator on Elk Creek, three miles southeast of Kellogg, is to have its capacity increased to handle 100 tons of mine ore daily. The entire mill will be remodeled and the work will be completed about June 1, according to Stanly A. Easton, president. An addition of jigs, rolls and classifiers will be made to the flotation machines now in use. The tube mill is being relined. These improvements were necessitated by the recent strike of lead-silver ore on the Crescent group and upon completion active mining operations will commence. At this time about fourteen men are employed on development work on the Alhambra and Crescent properties.

Large chunks of rich gold-bearing ore was received by W. W. Johnson, Peyton Building, Spokane, secretary of the Giant Ledge Mining Company, from its property on the Coeur d'Alenes, four miles above Murray. The ore comes from under the old gold shaft where rich ore was found several years ago. Several weeks ago the ore was struck in the north drift and was followed, parallel to the ore shoot for thirty-five or forty feet. Then a crosscut of the shoot was started and continued fourteen feet. Tests are being made of the ore, which will show heavy gold value with some lead and silver. The company sank a shaft 400 feet below the creek level and from the bottom of the shaft has drifted both north and south. In the south drift, continued 600 feet, three ore shoots carrying strong gold values were found. The north drift has gone about 1,000 feet to the point under the old gold shaft, where the new ore shoot was encountered recently.

Stewart Campbell, new state mining inspector of Idaho, was a visitor at Spokane recently, on his first trip to northern Idaho in fourteen years. Mr. Campbell is a graduate of the school of mines at the University of Idaho, class of 1907, but has confined his mining practice to the southern part of the state. Mr. Campbell has just completed a survey of the mining properties in Bonner and Boundary counties, and will soon visit the Coeur d'Alene district. He had just been visiting the Idaho Gold and Ruby property near Leonia. Regarding this, he said: "The plan of placer mining at this property is unique, the method of saving values is unique, and so is the method of final reduction. A method of separating black and gray sands has been perfected, and if the new concentrating plant works as successfully on a large scale as it does in the working model, it will be a new step in placer mining practice. It is planned to

save values in lead, copper and other minerals, including garnets, mis-called rubies, as well as gold."

The Bunker Hill & Sullivan Mining Company has acquired the Mayflower-Bullion mine, consisting of six claims, located seven miles from Hailey, in the Wood River district, and will commence operations within a short time. Equipment has been shipped and work will start at once, according to Stanly A. Easton, general manager of the Bunker Hill & Sullivan. The Mayflower mine was originally owned by the late Colonel E. A. Wall of Salt Lake and the Bullion property was among the holdings of the Wood River Gold and Silver Mining Company. The two properties were operated in 1881 and since that time have produced over 12,000 tons of lead-silver ore with a gross value of \$2,000,000. The ore taken out has shown a high silver ratio. Materials and equipment have been shipped to the property. At present the Wood River Power Company is building a power line from Hailey to the Mayflower-Bullion, seven miles. The ore from the property will be shipped to Kellogg and handled at the Bunker Hill smelter.

MONTANA.

The iron mines near White Sulphur Springs will soon be shipping a carload of ore daily to the East Helena smelter. Harvey brothers, who have the hauling contract, are putting on eight four-horse outfits to handle the ore from the mine to the loading platform at the railroad.

Two feet of high grade silver ore has been opened in the Obelisk mine near Basin, according to reports reaching Butte. A sample of the ore taken across a width of 26 inches assayed 92 ounces in silver and 10 per cent lead. The ore was struck in an upraise from the 200 east drift below the tunnel level.

Wooden business buildings in Neihart, one of Montana's historic mining camps, were burned Monday, May 2d, with a loss estimated at \$225,000. Judge George Roehl, 83, one of the town's oldest residents, was burned to death. The fire destroyed the concentrator of the Cascade silver mines and mills, the shaft house of the Queen of the Hills mine, two residences and the Frisco hotel, a wooden structure, built in the early 90's by Judge Roehl.

William Criderman has returned to Libby for the beginning of the prospecting season after spending the winter with his family in Spokane, says the Libby News. He is interested with William Cady and Joe Sheffield in a promising gold property on Libby creek, about 23 miles from the city, and intends to spend this season opening up the ledge. This group of claims is situated above the famous Libby creek placers, and

Mr. Criderman has good reason to believe that he may uncover the vein from which the Libby creek gold deposits have come.

George A. Montrose and H. H. Boone made a trip to Masonic to inspect a recent discovery in the Myrtle and Julia mine, of which they are the principal owners. Mr. Typin, who made the find, uncovered the ledge to a depth of eight feet and pannings indicate values of about \$25 in free gold. While at Masonic the owners let a contract to have the shaft sunk to a depth of fifty feet, says the Gardnerville Record-Courier.

Ore running \$1,200 to the ton in silver has just been uncovered at the old Union mine in the Elkhorn district, according to report.

NEVADA.

A great hydro-electric smelter for the state of Nevada, capable of fusing the ore of every known metal, is part of the plan proposed by State Engineer Scrugham to follow the harnessing of the waters of the Colorado river.

"Dry Wash" Wilson, one of the best known mining men of the Manhattan district, is to resume operations on his placer ground. Wilson is credited with taking out over \$50,000 in placer gold from his Manhattan holdings.

W. R. Anderson and Henry Rice, Sr., have sold their gypsum deposit in the Moapa valley, five miles southeast of Moapa, to the Engineering Construction Company of Los Angeles, a strong concern. The first payment was made in Los Angeles and the rest of the purchase price of \$45,000 is to be paid in installments.

Goldfield Great Bend continues to attract attention by its ore discoveries. This time it is a find of \$178 ore right at the surface. A few weeks ago a lease was granted and the lessee started work. Only a few days' work and a rich stringer was uncovered. This has widened to an eight-inch streak that shows assays of \$178.

A large section of Nevada landscape was upset the other day as the result of a blast put off at the Eureka pit by F. M. Grant, in charge of the Nevada Consolidated Copper Company's surface operations. The charge was composed of two tons of black powder and 500 pounds of dynamite, distributed over an area 230 feet by 70 and 100 feet underground.

A shipment of 85 tons of gold ore from the Warrior mine in the Simon district, Mineral county, Nevada, to the mill of the Olympic Mines Company has been made. The Warrior mine, better known as the McNamara property, is being operated by Bonnemort, Stott and Miller under a bond and lease and is located a few miles east of the Olympic mine in what is known as the gold belt of the Simon district. Recently they

opened up a four-foot ledge of high grade milling ore.

Judge Farrington of the U. S. district court of Carson City has appointed S. R. Moore of Tonopah receiver for the Louisiana Consolidated Mining Company at Tybo, Nye county. The company last year completed construction of a concentrator and smelter under the supervision of L. W. Draper. It is said to have liabilities of \$500,000, principally due to eastern creditors.

Good reports continue to come from the Johnnie placer gold fields in the southern extremity of Nye county. Many leases have been let by claim owners and the gulches are dotted with men sinking to bedrock. A few have been successful at shallow depth to reach bedrock and are making good wages panning the gold. There is no doubt of the precious metal being channel gold and not pocket gold.

WASHINGTON.

Lower freight rates on ore shipped from the Okanogan and Republic district, in northeastern Washington, to the smelter at Tacoma, with a refund of claimed overcharges in the last two years, was asked of the Great Northern railway by the Arlington Mining Company, Okanogan, at a hearing by the department of public works at Spokane recently. Reductions in freight rates asked range from 5 to 10 per cent. The case and plea of the Arlington Mining Company is representative of all miners and shippers of ore in the Okanogan and Republic districts.

Ben Olsen was snagging wood on the Herman claim belonging to the Iron Creek Mining Company, twelve and a half miles from Keller, recently, when he tore the cropping off a ledge of ore that was found to carry 325.4 ounces of silver to the ton. "He came down and asked me to go and look at it," said J. E. Angle, superintendent of the mine. "So, with several others, I went and the men with me became so interested that they worked all forenoon picking away. We do not know yet how much it amounts to, but it may prove to be a find of great value, for this is something we did not know existed and adds considerable to our values. The ore is bromide, chloride and sulphide. Iron Creek has been working five men all winter and will install a cyanide plant which will take the silver values out of its ore. We have had our ores thoroughly tested by the cyanide process, the tests being made at the mine, in Spokane and at the state college at Pullman. We built a mill last year and when we put in this new plant we will be able to make a good profit out of our silver." Practically all the stock in the Iron Creek company is owned by Spokane men. J. R. Abraham, president; John W. Duncan, vice president; J. E. Angle secre-

tary, and J. E. Kennedy and H. Phil Brandner directors.

Petroleum Notes

The Cat Creek Water Company's line has been fully completed and is ready to supply water to all the wells in the field.

John E. Finnerty of Findlay, Ohio, is moving a National rig to his holdings in the Caineville district, freighting from Sigurd by way of Loa, a distance of 100 miles.

It is reported that a showing of oil sufficient to bring on the usual excitement has been discovered near Camas Prairie, Sanders county, Montana. Farmers have organized a company and will start a test in order to find out whether or not a real pool exists.

The Ohio is having considerable trouble with its test in the Ragged Point structure of Montana. Eight-inch casing was successfully set at 2,400 feet, but later collapsed owing to enormous water pressure. In attempting to pull, the casing separated and a breakage of machinery stopped all work at the well. Considerable time will elapse before the well can be completed.

The secretary of agriculture and natural resources of the Philippine government has just approved five oil leases, all applied for by the Mindanao Oil Company. Four of the concessions are 1,200 hectares each in area and the fifth is 700 hectares. They are all located in Cotahato, one of the fertile regions of the island of Mindanao. The lease is to run for a period of five years, to be renewable for a like period upon its expiration.

With approach of warm weather, activity in local oil shale work is becoming more pronounced each day, says a Grand Valley, Colorado, news item. Several autos are employed to carry forces of men from here to the workings in the nearby hills. There are also several camps established at the points of operation. The way the rush of shale work is starting this spring points to exceptional activity in local shale camps during present year.

Test wells are to be started very quickly by the Utah Oil Refining Company on two southern Utah structures, according to W. R. Calvert, geologist for the company. The first test will be drilled on the Salt Wash anticline and the second on the Farnham dome below Price on the main line of the Denver & Rio Grande railroad. Drilling equipment for the first test is already assembled in Wyoming and will be shipped during the next few days.

With the advent of milder weather, wildcat work in central Montana and other sections of the state is speeding up. Nearly all of the more important producing oil companies are now interested either directly or

indirectly in development work in Montana. With the tests already under way and the number assured in order to comply with government requirements on federal lands, probably not less than \$10,000,000 will be spent in 1921 in prospect work for oil and gas.

The Black Rock Oil & Gas Company at Sulphur Siding, fifty miles west of Winnemucca, Nevada, after being closed down for more than two weeks on account of being short of large size casing, has received a shipment of the casing and is again pounding away toward the liquid gold, which is believed to exist in the heart of the Black Rock desert. The drill was started again on April 28th and will continue to pound away steadily now until the depth is reached where it is believed the oil sands will be found.

The question of Silver King Coalition Mines Company engaging in oil development operations will be submitted to the stockholders of the company at the annual meeting which is to be held Monday, in Salt Lake, according to officials of the company. Directors of the company have before them several oil land deals that are regarded favorable but because time for the annual meeting is so close at hand they decided to defer action until the stockholders of the company could give an expression on the matter.

Holdings of the Matador Oil Company in the vicinity of Duchesne have been taken over by the Ute Oil Company, said to be an independent Colorado concern, headed by a group of nationally known oil geologists and operators. Max W. Ball, former manager of the Matador company, who heads the Ute company, states that the development program planned by the Matador company will be carried out by the new company as quickly as possible and that drilling will be started as soon as necessary organization matters can be attended to and equipment assembled.

Work on the Big Six well is going forward smoothly, according to reports received from the camp. At 1,090 feet the hard limestone gave place to shale and this formation was still being drilled at 1,140 feet. Since the arrival of the engine parts the entire rig has been thoroughly overhauled and is now in excellent condition for the completion of the well, which according to oilmen on the ground should occur most any time now. A very strong odor of petroleum is evident at each bailing and it is probable that a sand will be encountered underlying the shale bed now being drilled.—Moab Times.

The skeleton rider of the pale gray horse appears to have a new steed—the white mule.—Arcola (Ill.) Arcolian.

Construction Notes

Thomas P. Mitchell of Ouray, Colo., has applied to the federal power commission for license for a transmission line two miles long across the Uncompahgre National forest, Ouray county, to furnish power to a mine.

Daniel J. Atherly of Vernon, Tooele county, desires to irrigate 3,000 acres of land and to that end has applied to the state engineer for authority to divert 600 acre feet of water from the flood waters running into Faust creek in Tooele county, the waters to be stored in a reservoir which he will construct.

On the 11th instant the Salt Lake Board of Education instructed Clerk L. P. Judd to advertise for bids for the construction of the \$1,000,000 west side high school. The board also decided to advertise for bids for the construction of a bridge across the Jordan river at the Jordan high school site. The bridge is to be of steel, eight feet wide and seventy-five feet in span.

F. M. Shelton, of Duchesne, Utah, president of the Upper Blue Bench Irrigation district in Duchesne county, was in Salt Lake early in the month on business connected with the \$500,000 bond issue which the district is negotiating. The money is to be used in the construction of dams and providing equipment for the handling of water from Duchesne river to irrigate 20,000 acres of land.

In the current issue of the Mining Review Walter Hovey Hill, consulting engineer for the United Metals & Power Corporation, operating in Custer county, Idaho, with headquarters at Stanley, is advertising for the following second-hand machinery and mill equipment: One jaw rock crusher; one 4x4 or 4x6 ball mill; one 75 kw. 400 volt generator; one 30 and one 15 h. p. motor, and general equipment for a 25-ton all-sliming cyanide plant. For additional details consult the advertisement.

The Silverado mine, near Sweetwater, Nevada, is to be equipped with a 150-ton mill, cyanide plant and its own electric power plant during the current year, according to plans already completed and which are to be prosecuted immediately. A. G. Anderson of Chicago, 1201 Monadnock building, president of the Nevada Progressive Mining Company, which owns the property, was recently in Reno, and with E. F. Hall, who has been engaged as general superintendent, left for Sweetwater to begin the survey of the power line, the preliminary work of the undertaking. The new mill will be located about 6,000 feet from the mine from which the ores will be transported by means of an aerial tramway, which is one of the new improvements to

be made. At least \$250,000 will be expended equipping the property.

Development work has been stopped at the Silver Reef Consolidated Mines Company's property near St. George, Utah, and from now on the company, it is said, will center its efforts on the construction of a milling plant. Officials of the company have received a communication from the New York offices of the McQuatters corporation, which owns the controlling interest in the property, stating that, inasmuch as such large bodies of milling ore have been blocked out, it is no longer necessary to carry on exploration work, and that from now on till the mill is constructed the company would focus its efforts upon a speedy construction of the new metallurgical plant. Alex Colbath, with offices in the Newhouse building, Salt Lake, is manager of the properties.

Personal Mention

Charles Peter, the well known mining operator, left for a short trip to Idaho on the 10th.

F. M. Shelton, of Duchesne, Utah, was in the city for several days early in the month on mining and irrigation business.

David Lemmon, one of the best known mine managers of Utah, has recently cast his lot with the Emma Silver property, at Alta.

A. R. Wilfley, inventor of the Wilfley ore concentrating tables, passed through Salt Lake early in the month en route from the coast to his home in Denver, Colorado.

C. H. Clapp, president of the state school of mines of Montana, has been named as president of the Montana State University to succeed Dr. E. O. Sisson, who resigned the position late in April.

Edmund A. Guggenheim, of Guggenheim Bros., New York City, has returned from a three-months' trip through Peru, Bolivia, and Chile, in the interest of the American Smelting & Refining Company.

A. R. Kohlmetz, E. M., having completed the design for the new Marcy roller mills for the Mine & Smepter Supply Company, is now examining some mining claims in the Woodriver valley, with address at Bellevue, Idaho.

Lester Gray French, of White Plains, N. Y., assistant secretary of the American Society of Mechanical Engineers and the editor and manager of Mechanical Engineering, died at the French hospital, New York City, on April 19, after an operation.

W. S. McCornick, president of McCornick & Co., bankers, submitted to the amputation of his right leg above the knee on the 3d instant. Thrombosis of the popliteal artery located behind the knee is said to have caused the condition which necessitated the

amputation of the limb. Mr. McCornick stood the operation well, notwithstanding his advanced age, and is now reported as getting along splendidly.

A. S. Walter, mining engineer and metallurgist, with the American Smelting & Refining Company for the last six years, is now with R. J. Walter, mining engineer, and president of Uinta Oil & Exploration Company, at 501 Symes Building, Denver, Colo.

F. L. Byron, one of the big boosters for the natural resources of Utah, and who is digging into them all the time, was up from Delta recently for the purpose of having chemical determinations made of the character of some of Millard county's little understood mineral deposits.

Fred B. Church, of Church & Crampton, mining and metallurgical engineers, Los Angeles; was in Salt Lake a few days ago on professional business. Mr. Church and his partner have become interested in Silverhorn, Nevada, where some first-class silver mines now are being developed.

R. C. Gemmell, general manager of the Utah Copper Company, returned on the 2nd instant from a trip east and says it is impossible yet to tell when the company will resume operations. Business in the east is still very quiet, he said, but prospects are growing brighter each day.

Charles Bocking, general manager of the Butte-Superior Mining Company, has returned to Butte, Mont., after a short visit in Salt Lake. Mr. Bocking said that while Butte was quiet, conditions were better there than in many copper camps, because most of the companies were doing considerable development work.

M. J. Gavin, oilshale technologist for the United States Bureau of Mines, has been asked to address the International Railway Fuel Association convention in Chicago May 24 on "Oil Shale and Its Value as a Fuel Resource." The invitation of the association has been accepted. Mr. Gavin, who at present is stationed in Salt Lake City, will leave for Chicago in a few days.

M. R. Evans, president and general manager of the Columbus-Rexall Mining Company, who has had a long siege of confinement in a local hospital recuperating from a serious operation, was able to return to his home ten days ago, and now is rapidly building up his strength. His host of friends are happy to know that he won a gallant fight with the Grim Reaper against big odds.

Prof. Earl Douglass, the well known geologist for the Carnegie Museum, whose home is at Jensen, Uintah county, Utah, broke away from his field work long enough to make a flying trip to Salt Lake a week ago. The professor predicts a great future for the Uintah Basin and adjacent country as a producer of oil, oil-shales and other hydro-carbons.

HILL CREEK OIL COMPANY TO DRILL IN UINTA COUNTY

Articles of incorporation of the Hill Creek Oil and Refining Company have been filed with the secretary of state. The officers are: President, John H. Wootton; vice president, F. C. Stannard; secretary and treasurer, W. C. Alexander; George H. Short, Jacob Evans, J. F. Critchlow and J. Louis Strogauer.

Professor Earl Douglas, geologist for the Carnegie Museum, who gave a lecture on the Hill Creek dome at the Commercial club a week ago, has left for the field to make further examination and to locate a drilling site for the first well of the company. John H. Wootton, president of the company, is accompanying Professor Douglass, and George H. Short, engineer and geologist for the Grasselli Chemical Company and consulting engineer for the Hill Creek Oil and Refining Company, will join Professor Douglass in the field in making the examination and recommendation as to the drilling site.

Professor Douglass, in his lecture at the Commercial club estimated that first producing sands could be reached on the Hill Creek dome in less than 800 feet.

It is stated that the company plans to put down a test well immediately on the location which may be selected by Professor Douglass and Engineer Short.

NEW YORK ASSAY OFFICE IS CHOKED WITH GOLD.

(New York Curb.)

Deluged with a steady stream of gold from every quarter of the world, and with their vaults choked and creaking under the weight of gold in bars, in strips and in coin, officials in the government assay office in New York have thrown up their hands and called a halt to the amount that shall be dumped upon them by bankers, for melting and assaying.

The assay office in New York has instructed bankers importing gold to send the metal to Philadelphia. This is being done with approximately half of the \$40,552,000 that has arrived in New York since April 1.

The Equitable Trust Company has sent its last shipment of gold to Philadelphia for assay and credit. The Bankers Trust Company is shipping some of its imports to the same mint, and the American Express Company is sending virtually every bar it imports in especially guarded cars.

There are two means by which bankers can dispose of the metal now rolling in on them. One is to deposit it with the Federal Reserve Bank, the other is by depositing it with the assay office. The Reserve Bank now will take only British bars, on which it makes an advance of 98 per cent to importers, settling up when the metal is assayed. The assay office advances 90 per

cent of the estimated value, remitting the balance when the gold finally is melted and weighed.

Officials of the assay office say there is ample room in the underground vaults of the new building, but that the gold, before storage in these vaults, must be weighed and assayed. This department acts as the neck of the bottle and it is here the congestion in the gold traffic has interfered. Men employed in the department have been put on a twelve-hour shift to reduce the quantity of gold on hand.

UTAH SMELTING RECORDS FOR 1920.

From tables prepared by the mining department of the state industrial commission it is learned that in 1920 there was smelted in the Midvale smelter of the United States Smelting Company; the Murray smelter of the American Smelting and Refining Company; the Tooele smelter of the International Smelting Company; the Garfield Smelting Company and the Judge Mining and Smelting Company of Park City, 1,626,269 tons of ore.

From this tonnage there was produced during the year 317,906,829 pounds of metal, and to mine the ore and smelt the output there were employed 2,315 men, who worked every day in the year, with the exception of the Judge zinc smelter, which was shut down a part of the year on account of the low price of zinc.

The capacity of the smelting plants in the state is shown to be 12,200 tons per day, or 4,453,000 tons per year, so that the tonnage of ore which was sent to the smelters was only a little more than one-third the combined capacity of the plants.

The maximum number of men employed in 1918 was 5,058, and in 1919 this number was reduced to 2,541. In 1916 the number employed was 2,358, and in 1917 the number was 4,469. With the exception of 1920 the employees worked every day in the years named.

REASONS FOR FAVORING USE OF PERMISSIBLE EXPLOSIVES

In a statement outlining his reasons for favoring the use of permissible explosives in coal mining operations, made by H. Foster Bain, acting director of the United States Bureau of Mines, attention is called to the remarkable reduction in recent years in the rate of coal mine fatalities due to the use of explosives. In 1903 there were 138 such fatalities in the United States, a percentage of 9.80 of the total number killed, and a death rate of 0.339 per thousand men employed. There has been a steady decline in the rate until in 1919 there were but fifty-seven deaths from this cause, but 3.41 per cent of the total number of fatalities.

"While permissible explosives are de-

signed so that they may be relatively safe for use in gassy and dusty coal mines," said Mr. Bain, "their strength characteristics make them suitable for other kinds of mining, for railway and construction work and a wide variety of other blasting operations.

"From the standpoint of general safety, they are found to be virtually insensitive to the detonation produced by percussion, friction or flame.

"In order to test permissible explosives, the Bureau of Mines has constructed and maintains a completely equipped testing plant at the explosives experiment station, Bruceton, Pa., where the explosives are not only tested chemically and physically in the laboratory, but elaborately in an experimental mine or artificial gallery.

"The explosives are fired into a number of explosive mixtures, such as air and gas, air and fine coal dust, such as is present in dangerous mines, and the results are observed. The strength of the explosive is also determined and the results published from time to time, in order to keep the user of the explosive informed.

"The gases evolved on the detonation of a permissible explosive are very carefully determined and a limit set by the bureau on the quantity of poisonous gases that the explosive may evolve on detonation.

"Before the establishment of test requirements by the United States government, there were used in the coal mines of the United States in the year 1902, 11,300 pounds of explosives, which were then called short-flame explosives, while in 1909, after the installation of the Pittsburgh testing station of the technologic branch of the geological survey, the nucleus out of which grew the bureau of mines, 8,942,857 pounds were used. The greatest quantity of permissible explosives used in coal mines was in 1918, when 37,262,915 pounds were used. There was a falling off in 1919, due to the decreased production of coal, 32,840,196 pounds being used.

"The following table shows how fatalities due to explosives at bituminous coal mines have decreased:

Year	No. killed	Percent of total killed	No. killed per 1,000
1903	138	9.80	0.339
1904	121	8.64	.290
1905	119	7.49	.264
1906	115	7.27	.246
1907	134	5.29	.264
1908	109	6.17	.216
1909	122	5.88	.244
1910	113	5.09	.203
1911	72	3.68	.130
1912	70	3.85	.128
1913	63	2.91	.110
1914	56	3.01	.096
1915	76	4.52	.136
1916	60	3.59	.107
1917	55	2.60	.091
1918	85	4.19	.138
1919	57	3.41	...

Gross income for 1920 of the American Smelting & Refining Company was \$15,747,715, an increase of \$1,051,972 over 1919, according to the annual report. Net income of \$6,674,779, increased by \$1,079,194, and the profit and loss surplus showed a nominal gain of \$12,721.

United States Smelting, Refining and Mining Company

Buyers of

Ores and Concentrates

Matte and Furnace Products

TERMS QUOTED FOR SMELTING ORES, ALSO FOR CONCENTRATING ORES CONTAINING LOW PERCENTAGES OF BOTH LEAD AND ZINC, ON APPLICATION TO THE UNITED STATES SMELTING, REFINING AND MINING COMPANY, NEWHOUSE BLDG., SALT LAKE CITY. SMELTER AND LEAD AND ZINC CONCENTRATING AND SEPARATING MILLS AT MIDVALE, UTAH; COPPER SMELTER AT KENNETT, CALIFORNIA; ZINC SMELTER AT CHECOTAH, OKLAHOMA; LEAD AND ZINC CONCENTRATOR AT NEEDLES, CALIFORNIA; LEAD REFINERY AT GRASSELLI, INDIANA.

INSECTICIDES, FUNGICIDES, WEED KILLER, POISON BAIT, FOR SALE BY OUR AGRICULTURAL DEPARTMENT, NEWHOUSE BUILDING, SALT LAKE CITY, UTAH.

SALT LAKE MINING STOCK QUOTATIONS

The range of the market from April 25th, 1921, through May 11th, 1921, inclusive. Quotations furnished by J. A. Hogle & Co., direct wires to all leading markets, 169 South Main St., Salt Lake City, Utah, and ground floor Eccles Bldg., Ogden, Utah.

CLOSING								CLOSING							
Stock	Open	High	Low	L. S.	Bid	Asked	Sales	Stock	Open	High	Low	L. S.	Bid	Asked	Sales
Antelope Star ..	.03 1/2	.04 1/2	.03 1/2	.03 1/2	.03 1/4	.04	24,600	Kennebec .....					.07	.10	
Alta Con. ....	.05 3/4	.05 3/4	.05	.05	.02	.02 1/2	.....	Lehi Tintic .....	.04 1/2	.04 3/4	.04	.04	.04	.04 1/2	21,400
Albion Cons. ....	.01	.01	.00 3/4	.00 3/4	.05	.06	.....	Leonora .....	.02	.02	.01 3/4	.01 3/4	.01 3/4	.02	32,000
Am. Metal .....	.06 3/4	.07 1/4	.06 1/2	.06 1/2	.00 1/2	.01	1,500	Little Bell .....						.35	.....
Alta Tunnel .....	.04	.04	.04	.04	.03 3/4	.04	2,000	Logger .....						.00 1/2	.01
Bullion .....	.03 1/4	.03 1/2	.03 1/4	.03 1/4	.03	.03 3/4	1,000	Monzonite .....	.01 1/4	.01 1/2	.01 1/4	.01 1/4	.01	.01 1/4	13,000
Big Cot. Coal ..	.02 3/4	.03 1/2	.02 3/4	.03 1/2	.03 1/4	.03 1/2	28,000	Mammoth .....	.35	.35	.35	.35	.25	.40	100
Beaver Cop. ....	.30	.33	.27 1/2	.28	.27	.29	17,300	Miller Mill .....	.01 1/2	.02	.01 1/2	.02	.01 1/2	.03 1/2	2,000
Bay State .....	.03	.03 1/4	.03	.03	.03	.04	6,500	May Day .....	.02	.02	.02	.02	.01 1/2	.02 1/4	1,000
Black Metal .....	.00 1/2	.00 1/2	.00 1/2	.00 1/2		.01	400	Mason Valley					1.50	1.75	
Cedar Talis. ....	.25 1/2	.29	.25	.29	.27	.28 1/2	8,500	Moscow .....	.02	.02	.02	.02	.01 3/4	.02 1/4	3,000
Colb. Rexall .....	.01 3/4	.01 3/4	.01	.01	.01	.01 1/4	19,000	Mich.-Utah .....	.05	.05 1/2	.04 1/2	.04 3/4	.04 3/4	.05	82,400
Crown Pt.	1.10	1.15	1.10	1.10	1.07 1/2	1.15	400	New Quincy .....						.19	.....
Cardiff .....	.01 3/4	.01 3/4	.01 3/4	.01 3/4	.01 1/4	.01 3/4	2,000	Nalldriver .....						.02	.....
Croff					1.50	2.10	.....	Neva .....	.06 1/2	.07 1/2	.06 1/4	.06 1/4	.06	.06 1/4	67,900
Daly					2.75	3.50	.....	N. Standard .....	.02 3/4	.03 1/4	.02	.02 3/4	.02 1/2	.03	14,000
Daly West .....	.05	.05	.05	.05	.02	.05	1,000	O. K. Silver .....	.21	.21	.21	.21	.21	.25	500
Dragon .....	.01	.01	.01	.01	.00 3/4	.01 1/4	3,000	Old Emery .....	.22	.22	.19	.21	.20	.25	4,300
Demijohn Con. ....	.01 3/4	.02	.01 3/4	.02	.02	.02 1/2	15,000	Plutus .....	.34	.34 1/2	.27	.28	.28	.28 1/2	40,500
Emma Silver .....	.02	.02	.02	.02	.02	.04	350	Prince Con. ....	.01 1/4	.01 1/4	.01 1/4	.01 1/4	.01	.01 1/2	7,500
Empire Mines .....					.02	.05 1/4	.....	Paloma .....	.01 1/2	.01 3/4	.01 1/2	.01 3/4	.01 1/2	.01 3/4	6,000
Empire Copper ..	.05	.05	.05	.05	.04	.05	1,000	Pioche Bristol ..	.05 1/4	.05 1/4	.05	.05	.04 3/4	.05 1/4	4,500
Emerald .....	.04 1/4	.04 1/2	.04	.04 1/2	.04	.05	5,000	Provo .....						.00 1/2	.02
Eureka Mines .....					.01	.01 3/4	.....	So. Pacific .....	.10 1/2	.10 1/2	.10 1/2	.10 1/2	.10 1/2	.11	1,500
E. Crown Pt. ....	.07 3/4	.07 3/4	.07 3/4	.07 3/4	.07 1/2	.08 1/4	1,000	So. Standard .....	.03 1/4	.03 1/2	.02 3/4	.03 1/2	.03 1/2	.04	7,000
E. T. Con. ....	.07 1/2	.08	.07 1/4	.07	.06 3/4	.07	19,800	Sells .....	.00 1/2	.00 1/2	.00 1/2	.00 1/2	.00 1/4	.00 1/2	13,000
Eureka Lily .....	.08	.12	.08	.09 1/4	.09	.09 1/4	37,100	Syndicate .....	.79	.90	.75	.75	.74	.75	3,300
Eureka Bullion ..					.03	.04 1/2	.....	S. K. Con.	1.95	2.00	1.75	1.75	1.75	1.80	2,150
Gold Chain .....					.07	.07 1/4	10,500	S. K. Coal .....	.02	.02	.02	.02	.01	.02	1,000
Grand Central ..					.00 3/4	.01 1/4	.....	Swansea Con. ....	.63	.65	.63	.63	.55	.61	200
Great Western ..					.07	.07 1/4	.....	South Hecla .....	.10	.14	.10	.11	.10	.12 1/2	14,900
Hamburg Mines ..	.08	.08	.07 1/4	.07 1/4	.01	.02	6,500	Silver Shield .....	.00 1/2	.00 1/2	.00 1/2	.00 1/2	.00 1/4	.01	2,000
Howell .....	.01 1/2	.01 3/4	.01 1/2	.01 1/2	.16	.18	2,500	Tecoma .....	.01 1/2	.01 1/2	.01 1/4	.01 1/4	.00 1/2	.01 1/4	3,000
Home Run .....	.18	.18	.16 1/2	.16 1/2	.00 1/2	.00 3/4	.....	Tar Baby .....	.01 1/2	.01 1/2	.01 1/2	.01 1/2	.01	.01 1/2	1,000
Iron Blossom .....					.09	.10	3,000	Tin. Central	2.65	2.70	2.42 1/2	2.50	2.55	2.55	9,345
Indian Queen					2.50	3.50	.....	Tin. Standard .....	.01 1/4	.01 1/4	.01 1/4	.01 1/4	.00 3/4	.01 1/4	1,000
Iron King .....					.50	.50	.....	Utah Con. ....					.01 1/4	.03	
Judge M. S. ....					.02	.02	.....	Union Chief	2.15	2.30	2.15	2.30	2.42 1/2	2.75	650
Keystone .....					.00 1/4	.00 1/4	.....	Walker Mng. ....	.06	.06 1/4	.06	.06	.05 1/4	.06	8,000
King David .....							.....	Woodlawn .....	.04 1/2	.05	.04 1/2	.05	.04 1/4		1,500
Keno .....							.....	Zuma							

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, OF THE Salt Lake Mining Review, published semi-monthly at Salt Lake City, Utah, for April 1, 1921.

Before me, a notary public, in and for the state and county aforesaid, personally appeared A. B. Greeson, who, having been duly sworn according to law, deposes and says that he is the business manager of The Salt Lake Mining Review, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, The Salt Lake Mining Review, Inc., 1601 Walker Bank Bldg., Salt Lake City, Utah.

Managing Editor, Will C. Higgins, and Acting Editor, L. E. Camomile, 1601 Walker Bank Bldg., Salt Lake City, Utah.

That the owners are: Will C. Higgins, R. F. D. No. 1, Box 220A, Los Angeles, Calif. A. B. Greeson, 1601 Walker Bank Bldg., Salt Lake City, Utah.

That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities, are: There are none.

A. B. GREESON.
Sworn to and subscribed before me this 1st day of April, 1921.

EARLE L. COPPOCK.
My commission expires December 30, 1921.
(Seal)

ASSESSMENTS PENDING.

Louise Mining Company, 3/4c per share. Delinquent June 1. Sale day June 21.

Woodlawn Copper Mining Company, 1c per share. Delinquent June 1. Sale day June 25.

New Quincy Mining Company, 1c per share. Delinquent May 24. Sale day June 18.

Cottonwood Metals Mining Company, 1/2c per share. Delinquent May 31. Sale day June 21.

Union Chief Mining Company, 1/2c per share. Delinquent May 30. Sale day June 27.

Syndicate Mining Company, 1 1/2 mills per share. Delinquent May 27. Sale day June 14.
Leli Tintic Mining Company, 1/2c per share. Delinquent June 4. Sale day June 30.

METAL MARKET, MAY 10.

Silver, domestic 99 1/4c
Silver, in London 35d
Copper 12 3/4 @ 13c
Lead, New York \$5.00
Spelter, St. Louis \$4.90 @ 4.95

BOSTON STOCK QUOTATIONS.

May 10.	Bid.	Asked.
Bingham Mines	10	10 1/4
Chief Con.	2 3/4	2 5/4
Daly West	2 3/4	3 1/4
Iron Blossom	10	10
Mason Valley	1 1/2	1 5/4
Utah Apex	2 1/2	2 3/4
Utah Consolidated	4	4 1/4

SECOND-HAND MILLING EQUIPMENT WANTED.

We would like price, description, weight, and where same can be examined, on the following second-hand equipment: Jaw rock crusher, 25 tons capacity to 1 1/2-in., complete with pulley, give speed; one 4x4 or 4x6 ball mill; one 75 kw. 400 volt generator, 900 R. P. M., 3-phase, AC, 60 cycles; one 30 H. P. motor; one 15 H. P. motor; general equipment for 25 ton, all-sliming cyanide plant.

WALTER HOVEY HILL,
Stanley, Custer Co., Idaho.

MINERAL RIGHTS

Upon a 4000-acre tract adjoining the Duchesne Structure for less than the cost of patenting the cost of mining locations, valuable oil drilling and oil shale ground; also large veins of hydrocarbons. For particulars.

Address

F. M. SHELTON

Duchesne, Utah

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The Salt Lake Mining Review

VOL. 23 NO. 4

SALT LAKE CITY UTAH, MAY 30, 1921

SINGLE COPIES 15 CENTS

The Silverhorn Mining District.

By Theo. H. M. Crampton, E. M.

Silverhorn is so close to Salt Lake City that it is of interest to record the geological and economical features of the new camp that has sprung up in the last three months, where very large bodies of silver ores have been disclosed. The camp is located about twenty-three miles north of Pioche, and about three miles to the northwest of Bristol Wells, which in 1873 boasted of a population of 3500, and where a mill and smelter were operated for many years. It is reported that some quartz was secured from what is now the Silver Horn property for the use in the smelter as a flux, but if so, only boulders from the outcrop were taken, as there was no evidence of any work being done at the time the property was located by John L. Whipple.

Probably the outcrop upon the Silver Horn property was visited in the years gone by many prospectors who were attracted by the bold outcrop. But to an engineer or prospector it would appear at first as a bed of quartzite and, with no visible minerals at the surface to encourage the prospector, we can appreciate why the district was not disclosed before it was.

John L. Whipple, a rancher who drove a stage between Pioche and Sunnyside, sampled a portion of the outcrop one time when he was hunting for a lost horse in the seldom visited locality. The first sample taken showed splendid ore and resulted in his revisiting the outcrop and taking other samples. These went still higher, and Mr. Whipple sold the group of claims he located before the location work was done and even before the claims were staked.

How the Ore Bodies Make.

The position of the ore body is between a lime shale hanging-wall, and a dark blue lime foot wall, and to the casual observer it would be classified as a bed of quartzite, and has been so called in the past. The quartz replacement is, however, very irregular, and in places is only ten feet thick, while at others it is over two hundred feet thick. The surface appears barren and most unpromising, and not until it has been broken into do the silver minerals show to a sufficient extent to attract attention. In fact the ore at places shows no signs of minerals, but when panned, averages for each ounce and a half of pulp taken about five-eighths of an inch of native silver for each sixty ounces of silver contained.

The deposits at Silverhorn are of great interest to all engineers. In the first place practically everyone of the thirty of more geologists and mining engineers who have examined the district state that they have never seen the equal of the deposits either in character or extent. It is nothing less than astounding to find that development upon so extensive an outcrop could develop such enormous tonnages of material which carry milling values in so short a time and especially where the outcrop to the naked eye appears unattractive.

Extensive Faulting is Evident.

The Silverhorn district shows extensive evidence of

faulting, with major movements over extensive areas. These have taken place in the nature of block-faulting, and also as regional faulting in a general east-west direction. These faults resulted in the brecciation of the sedimentary beds, and the main ore found upon the Nevada Silver Horn property and the Silver Dale property occupies a position at the contact of the lime shale and the blue limestone. The original breccia was composed of fragments of the lime shale and the blue limestone. The introduction of the mineralizing solutions replaced the breccia with quartz, and at the same time introduced the silver.

There are many places in the outcrop where replacement never took place, as would be expected with any orebody



Open Cut in High Grade Ore on Crampton Hill, Nevada
Silver Horn Company's Property

of irregularity within or associated with limestone formations.

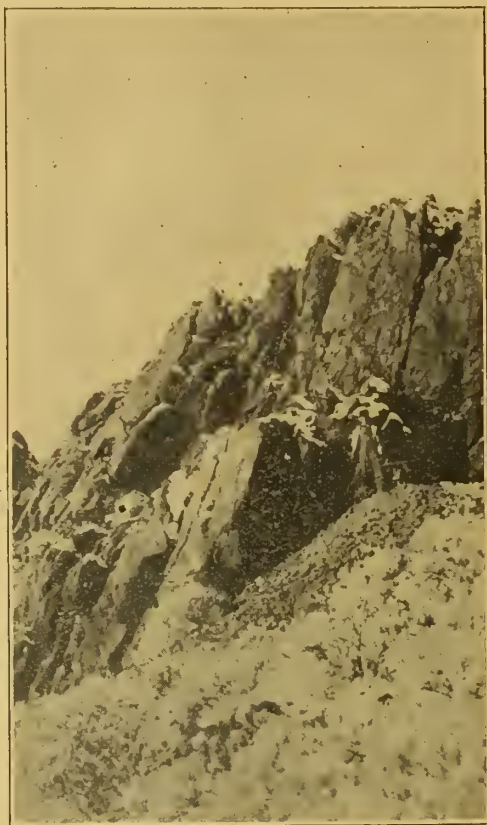
Subsequent to the first mineralization there was another series of movements which sheared the orebody of quartz in a north and south direction, and these resulting shear zones are frequent and vary from seven to 55 feet in width. These continued to receive the infiltration of solutions with a result that they carry values much higher than the portions of the outcrop which were not subjected to the second period of faulting and shearing.

Great Blocks of Ore Disclosed.

In the Number Two shaft the ore has been disclosed at a

point 285 deeper than the highest outcrop of ore, and is located 925 feet east of the high point on this outcrop known as the Mineral Monument. The Nevada Silver Horn company has been directing most of its development to that portion of the outcrop situated west of the Mineral Monument at the top of Crampton Hill, and they have developed a number of blocks of mill ore which would keep a 500 ton mill operating continuously over a very long period of time. The policy of the operators is toward development and research before the installation of their reduction works.

At many places phenomenally rich silver ore occurs and a number of leases have been let. The company is more in-



Massive Outcrop of Mill Ore, No. 2 Workings
Nevada Silver Horn Mine

terested in developing tonnages. The average of the mill ore was announced some time ago to be about \$15 a ton in silver; but from recent discoveries it is very probable that it will come nearer to \$17 a ton in silver. The gold content amounts to from twenty cents to forty cents to the ton. The ore is free from any minerals which will interfere in the reduction or concentration of the values by flotation or cyanidation.

The mines in the district are so far being financed principally by New York interests, but within the last few weeks many parties from the western states have visited the camp and acquired interests.

The camp has every indication of a Nevada boom silver camp, but the activities are devoted to energetic endeavors toward developing the ore bodies. A town has sprung up, and it is pleasing to report that the growth, which has been spectacular, is based upon the bona-fide mineral discoveries in the district. The engineers who have visited the camp have the utmost faith in its future, and a number have stated that the discoveries at Silverhorn have not been equalled in importance in the West for many years.

Is Not a One-Mine Camp.

Close observation of geological conditions and outcrops in the camp, indicate that Silverhorn is not going to be a one mine district. Already the Silver Dale and the Nevada

Silver Horn have large proven orebodies and the developments upon the Silver Horn Mining and Development property, formerly known as the Nickel group, indicate that another important mine is being opened up. Upon the Silver Peer property large tonnages of milling grade ore is being developed. A number of other properties now starting upon favorable showings should bring to the front additional mines of merit.

The town of Silverhorn comprises today—May 14th—about sixty five tents, buildings, office buildings, stores, etc. There are in the district about 275 people, with many new arrivals daily. The camp will double in size when the work upon the other company groups in the district is started. Silverhorn was an unknown locality four months ago with only one prospector in the district. There has been no let up in the growth, and many new business establishments are planned or in the process of erection.

SILVER STATE CHEMICAL COMPANY HASTENING PLANT CONSTRUCTION

Rapid progress is being made with construction work on the first unit of the new ore reduction plant being built for the Silver State Chemical Company on the east side of the city, says the Winnemucca Star of the 23d. The building now under construction is 96x128 feet and the walls are to be concrete. The footing, or base wall, has been installed and the forms are being put in place for the side walls of the building.

On the east end of the structure, covering 32x96 feet, is to be the machinery rooms. This part of the building is to be two stories, the balance of the structure to be one story only, with high ceilings, and will be used as tank rooms and laboratory.

On the side facing the railway tracks there is to be a run way where the ore unloaded from the cars will be trammed to the upper story to be distributed to the rock crushers and pulverizers. At the rear of the main structure there will be another building for boiler room and roasting furnace. This building is also to be of concrete and the footings and base for the roaster has been installed. Still further in the rear there is to be a large oil storage tank.

The well and pumping equipment is also at the rear of the main building. About twelve men are at work installing the forms and more are to be employed as soon as there is room for them.

The construction is under the management of L. L. Sowers, and under the supervision of L. E. Sowers, the metallurgist and chemist who will have charge of the plant when completed. The company has its own concrete mixer and in a few days an elevator is to be erected to hoist the concrete for pouring.

The greater part of the material, including reinforcing steel and iron, cement and lumber, is on the ground and there is to be no delay in completing the buildings.

W. A. Zimmerman, business manager for the company, stated that a large number of samples of ore and non-metallic minerals are coming to the company's laboratory to be tested.

The saline matter in the ocean is sufficient to make a block of salt measuring 4,800,000 cubic miles. If spread over the entire surface of the United States, exclusive of Alaska, it would form a crust more than a mile and a half deep. One per cent of the content of salt in the ocean would cover all the land areas of the globe to a depth of 290 feet.

No system of government is going to make it easy for the shiftless man.

GETTING DOWN TO HARD WORK IN CAMPS AROUND KINGMAN.

By William P. DeWolf.

Kingman, Arizona, May 25.—Measured by the standard of development work and development results, the precious metal bearing areas of Mohave county rank with the most prosperous mining sections of the country. From the standpoint of profitable investment opportunity they are unexcelled, for the vein systems are numerous and rich and have already produced millions of dollars worth of gold and silver laden ores. From the standpoint of mine work, always the best gauge by which to ascertain the miner's opinion of a mineral-bearing area, Mohave county is the scene of the most extended effort in the southwest. These facts are recognized and freely commented on by the mining men from outside points who are arriving here in increasing numbers to take over and develop properties. Kingman, the county seat, is their focusing point. And the county commissioners, recognizing their value as an asset, have constructed easy-graded, well-ballasted roads to all of the outlying districts.

During the last few days the list of noted mining men who have visited here of late was augmented by the arrival of Frank W. Stall of Tonopah, Nevada, who mined a fortune from the rich National mine, located in the Nevada camp of that name; D. W. Shanks of San Francisco, who has to his credit a number of mining successes in old Mexico and elsewhere, and H. R. Van Wagner of Denver, Colorado, one of the best known of the younger generation of mining engineers and geologists. Van Wagner served as umpire in the famous apex case affecting ownership of valuable mineral rights at Manhattan, Nevada, claimed by the White Caps and Morning Glory Mining Companies. All of the gentlemen named inspected the new gold camp of Katherine in Union Pass and commented favorably on its ore-yielding possibilities.

Machinery for the Sunbeam.

W. J. Loring, who recently bought the Sunbeam property at Katherine, has outlined to Superintendent E. S. Chaffee, now in San Francisco, the plans for its development. These include the installation of machinery capable of working to a maximum depth of one thousand feet and sinking of a double-compartment shaft to a depth of five hundred feet. The property is traversed by a strong fissure vein which at surface assays as high as \$40 gold a ton across a breadth of eighty feet.

At the adjacent Gold Chain property, owned by Mr. Shanks and associates, a similar campaign of development is in force under the supervision of C. F. Nourse. The massive vein outcrop on the Gold Chain is estimated to carry 100,000 tons of ore that can be milled at a profit.

On the adjoining Katherine Extension property Charles N. Miller of San Francisco, is sinking a deep working shaft to tap the continuation of the rich Katherine fissure. Surface values on the Katherine Extension range from \$3 to \$20 gold a ton.

Endlining with the Katherine Extension is the bonanza Katherine mine, where approximately \$4,000,000 worth of ore has been blocked out to a depth of 300 feet. Shaft sinking and development of the ore body is being facilitated by a new plant of machinery, that went into commission a few days ago.

Nearly the Katherine mine a deep working shaft is being sunk on the Katherine Mohawk property.

On the Gold Link property a vein has been uncovered that assays an average of \$5 gold a ton across a width of twenty feet.

Mine work at other points in the Katherine district includes development of ore in the Arabian mine, shaft sink-

ing on the Adams, Oatman Revenue and Black Dyke properties, tunnel operations on the Sheep Trail property and the extending of the drifts in the Roadside mine.

C. O. D. Plans Wide in Scope.

The Dudley Interests, owner of the C. O. D. and other valuable properties in the Cerbat Range, will soon extend the scope of operations to include all of its mine holdings. Morris B. Dudley, general manager, is at present in New York City conferring with his associates on this and other development matters, and upon his return to Kingman early next month, the work will be started.

In the meantime, R. S. Billings, consulting engineer and geologist for the Dudley interests, is making a thorough examination of the Daisell and Golden Star properties and will submit a report thereon to Dudley at an early date. The appointment of Billings to the position of consulting engineer and geologist is considered a wise move, and he stands high in his profession and is thoroughly conversant with the ore occurrences on the various properties owned by his employers.

Dudley and his associates have developed the C. O. D. property into the third largest producing mine in Mohave county, and expect to repeat this success at the I. X. L. and the other properties named. They have expended over a million dollars in mining work here and are the owners of silver mines in this county that are valued at several million dollars. In the C. O. D. mine alone the ore in sight on and above the 400-foot level has a value well in excess of \$1,000,000 and the reserve is being substantially increased daily. The ore shoot on the fourth level is 900 feet long, has an average width of five feet and an average value of about \$25 a ton. A station is now being cut at a depth of 500 feet preparatory to developing the shoot on that level.

Within two months of the date it went into commission the C. O. D. mill is handling 100 tons of ore a day and is turning out thirty-six dry tons of concentrates every five days of an average value of \$200 a ton. Mill production at this time totals \$43,200 worth of concentrates a month.

Another Mill Contemplated

I. M. George, of Kingman, and associates, are promising to operate the Hubbard, General Lee, Arnold and other old-time mines located in Cedar District. In the past years these properties produced a considerable tonnage of very high grade ore, most of which was shipped to Swansea, Wales. It is now the plan, however, to erect a mill convenient to the several shafts, as the plant recently established at the C. O. D. mine demonstrates that the refractory silicates of this county can be reduced at a substantial profit.

The Metallurgical "pioneering" done by the Dudley interests in the C. O. D. mine and mill have paved the way for the reopening of the base-ore bearing mines here, many of which carry high values in silver. A better idea of the high values carried by some of the local ores is gained when it is stated that small shipments from the Rawhide mine are being sent out by parcel post and that the ore has a silver content of several thousand ounces per ton.

At the Diamond Joe mine, one of the old-time bonanzas of the Wallapai range, plans are well advanced for opening the ore in the primary zone by means of a tunnel 1100 feet long, and to equip the milling plant with the units essential for its successful reduction. At a depth of 440 feet in the present workings the ore changes from an oxide to a sulphide and assays \$36 silver and \$8 gold per ton across a width of four feet. There are approximately 22,000 tons of ore in sight in the oxidized zone that can be mined and milled at a profit. E. C. Bradshaw and associates took over the property about a year ago and since then have expended nearly \$1,000,000.00 for machinery, property payments and mine work. Development of the ore bodies has reached the stage where the future of the mine seems to be assured.

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LATE AGAIN, BUT COMING STRONG.

This issue of the Mining Review—the May 30th issue—is going to subscribers several days late and, as was the case with our May 15th issue, the trouble has all resulted because of the difficulties existing in the ranks of the printing trades. Under the circumstances we are doing the best we can to keep up with procession until it is possible to get squared away and the “craft” problems are ironed out. The shortcomings of this issue are unavoidable. Please overlook them. The fight is waging for the principle of the “open shop” under the “American Plan.” During its pendency we are compelled to take “pot luck” with our compatriots in the struggle. We shall soon be out of the woods.

DEATH OF W. S. McCORNICK.

On the 18th instant, just at a time when friends felt that the critical point had been safely passed, William S. McCornick, the pioneer banker, mine operator and industrial benefactor of this great western country, made his final peace on earth and passed to the great Beyond. Being in his eighty-third year, the shock following the amputation of a leg was too great to overcome and he peacefully surrendered when the summons came.

William S. McCornick was recognized as one of the best bankers and men of affairs in the west. His ability and business foresight were accomplishments widely recognized and appreciated in every channel of industrial activity, from the smallest to the largest. For more than forty years a banker in Salt Lake, and previous to that prominently identified with mining, banking and business pursuits in California and Nevada, Mr. McCornick's name was known and his standing recognized in every western town and city, and his death will be keenly felt by thousands of people who knew him personally as a stalwart exemplar of Western manhood, pluck and energy.

Simultaneously with Mr. McCornick's decease, and indicating the care which dominated his business career, came the announcement that, with its founder and dominating factor gone, the McCornick bank would immediately be taken over and merged with the powerful and old-established Waker Brothers Bank. Every detail of the transfer had been previously arranged and the change was made without an instant's delay and without inconvenience to a single patron of either institution.

Thus the great banker and builder of the mighty west has passed away, while kindred spirits in one of the state's other and most powerful pioneer institutions, have picked up the reins and are continuing business with an eye single to strengthening the financial reputation of Salt Lake and Utah. “The king is dead; long live the king”

ASSESSMENT WORK SUSPENSION.

I have been a subscriber to your Review for several years and have always spoken well of it! I am a poor old prospector; have a few prospects; have done development on them for fifteen to thirty years! have not got anything out of them for ten years, but live in hopes. It certainly would be a great favor if Senator King would have his bill passed, remitting assessments until June 30, 1922. But according to your editorial you would rather stand in with the claim jumper than the poor prospector. I am certainly astonished at your stand. I think the prospector who takes chances is entitled to the gratitude of his government and should receive the small favor contemplated in the remission of his assessments when he has been working for years without receiving anything for his work.

The Mining Review never takes umbrage at honest criticism of its utterances; and it grants honesty of thought and purpose in this Idaho subscriber's complaint of what this journal had to say on the subject in a previous issue. But our friend argues from a mistaken premise. The expressed thought in opposing the suspension of assessment work for this and next year was to PROTECT the bona fide claim owner—like our Idaho friend—AGAINST the claim-jumper and “wild-cat” locator. Within the past two or three weeks nearly every mining camp publication in the west has taken the same view as that expressed in the Mining Review. It certainly can not be that we are “all out of step but Mickey.” Senator King's bill for the suspension of assessment work for the years 1921-2 was introduced in the U. S. Senate on the 27th, but it has little chance of being passed.

ANENT THE "SHALE ASSAY TON."

Ed. Mining Review: I am in the midst of enjoying your April 30th issue and just finished the article of Robt. B. Gemmell, of Gold Hill, Utah. As I may forget it in the morning at the office, will now answer his request that the "shale hounds" make criticism. The only remarks necessary to Mr. Gemmell is to advise him to get in the "game;" keep in touch with the U. S. Bulletins, Colorado School of Mines and the fine work being done by the joint efforts of the U. S. Bureau of Mines and University of Utah, at Salt Lake City, under "Mike" Gavin. If he will talk with Otto Stahlmann and J. B. Jenson of your "wonder town," he will find that 240-gramme charges have been the laboratory re-tort charge adopted by all for the past four years, and that one c.c. of distilled shale oil has been accepted as representing one gallon of shale oil per ton of oil shale.

From my observation it seems that many interested in oil shale development are not keeping up with the fine work being done at the University of Utah and other seats of learning—likewise, they either do not "take" the Salt Lake Mining Review, or do not read it.

Yours very truly,

Hudson F. Layton,
Engineer Oil Shale Division, Empire Gas & Fuel Company,
Bartlesville, Okla., May 15, 1921.

Another of Utah's pioneer mining operator, Henry Cohen, answered the final summons on the 26th at the ripe age of seventy-five years. For more than forty years he has been identified prominently with the building up of Utah's mining industry, being particularly interested in Alta, Park City, Timie and Bingham. During the past several years he had given more attention to his wool and other commercial interests than to mining, the details of which he gradually passed on to younger men. Henry Cohen was a most highly respected man in business circles and in his death this city and the state loses a most valuable citizen.

On the 26th the California Oil World issued a magnificent 104 page second section of its publication which features the "open door for oil." Authorative writers and men most familiar with the oil situation the world over contribute special articles dealing with all phases of the industry, existent and prospective. The Mining Review would like to more completely review the work and would, were it not for the difficulty we are finding in getting to press with our own publication, as a result of the struggle pending in and with the printing trades. As it is the World must "take the will for the deed."

THE PROPER UNION SPIRIT.

Michael Artery has issued one of the clearest and most logical bits of common sense on a matter of importance to the nation's reconstruction program that has been heard in this land for weeks, says the Oatman Mining News.

Speaking on the contractor's proposal to cut wages 12 per cent, he spoke to the union of which he is secretary as follows:

"What's the use of making a dollar and twenty-five cents per hour if we can't get work? The cost of living has dropped 29 per cent in the past year. We are asked to cut our wages to correspond to this decrease. The carpenters' union has rejected the proposal; the result is that 80 per cent of them are out of work and are not drawing a cent. At the reduced wages they might be working and making a living. Let us trim our wages, boys, and we'll all eat."

UTAH CON. OF BINGHAM MAKES 1920 ANNUAL REPORT.

Operations at the Utah Consolidated Mining Company at Bingham during the year 1920 resulted in a net loss of \$196,140.08, according to the company's annual report. Income from sales of metal was \$2,023,579.28. Total output of the mine was 57,747 tons of copper ore, which yielded 3,187,492 pounds of copper, 9,999,350 pounds of lead, 273,730 ounces of silver and 4697 ounces of gold. Exploration and development work totaling 10,423 feet was done, according to the report of R. H. Channing, Jr., president.

President Channing's report outlines the year's operations as follows:

"The principal features of the year's operations were:

"First—Construction of a mill for the treatment of copper ores, and the necessary mine equipment and underground development to permit economical extraction of these ores, particularly in depth.

"Second—Litigation with the Utah Apex company.

Big Mill Completed.

"A mill with a capacity of 1000 tons a day has been built near the terminus of your company's tramway at International, Utah, and will be ready in April. It will make available the low-grade copper ores developed in the mine.

The necessary equipment for the economical mining of these ores has been purchased and the preliminary work for their extraction has been largely completed. Exploration in depth is expected to add additional tonnage.

STATUS OF APEX SUIT.

"Decisions in the litigation with the Utah Apex Company were handed down by the United States district court in October. They were adverse to your company. They denied our claims to certain ore bodies heretofore worked by the Utah Consolidated.

An accounting which amounts to \$659,000 has been filed with the court covering the value of the ore previously extracted from this territory, for which your company will have to pay if these decisions are affirmed.

These decisions are contrary to all precedent in similar litigation in the district and an appeal from them will be taken to the United States circuit court of appeals. None of your company's principal copper ore bodies is involved in this litigation.

DRILLING EQUIPMENT EN ROUTE**TO THE SAN JUAN OIL FIELD**

It is reported that no less than 200,000 pounds of drilling equipment is at Dolores on the Rio Grande Southern railroad, awaiting transfer to the San Juan fields. Freighters will soon commence hauling the machinery to the fields, and several companies will be drilling by summer, it is stated. The Carter Oil Company and the Monumental Oil Company are interested jointly in a large tract of land on the Hukito structure, south of the San Juan river, and now that the government has commenced the issuance of prospecting permits and titles to other lands in that district are being adjusted, these companies will commence extensive operations.

Other companies which announce their intention to commence work in the San Juan are the Paradise Oil & Refining the Sunset Oil, the Mexican Hat Oil, the Arcola Oil, and several others. B. Hall, formerly a driller at Moab, is now general field manager of the Paradise company, and he passed through Moab the last of the week en route to the San Juan field, to make preliminary arrangements looking to the beginning of work.—Moab Times-Independent 19th.

Silver King Coalition Makes Gratifying Report

The annual meeting of the stockholders of the Silver King Coalition Mines Company, operating at Park City, was held on the 11th instant. Following submission of reports by officials of the company, the old board of directors were reelected and a few days later the board organized, first by filling the vacancy caused by the death of W. S. McCormick, by naming M. J. Dailey, mine manager of the company, director. As organized the official household is made up as follows: David Keith, president; Thomas F. Kearns, vice president; W. Mont Ferry, vice president and managing director; F. J. Westcott, secretary and treasurer. The Utah Saving & Trust Company was designated registrar and Mr. Westcott transfer agent.

The annual reports of officers of the company, regarding operations for the year 1920, which will be mailed to stockholders as soon as copies can be had from the printer, were submitted.

Will Fight for Smelting Rights.

An informal discussion of the advisability of the company's taking steps to develop the oil resources of land lying within southern Utah structures was had, but no action was taken. Resolutions, commending officials in their determination to resist the efforts of the American Smelting and Refining company to abrogate its contract providing for rates of treatment of the company's ore, were adopted. In addition to expression of commendation contained in the resolutions, shareholders instructed officials to take any necessary steps to hold the smelting company to the letter of the contract.

Managing Director's Report.

W. Mont Ferry, vice-president and managing director, in his annual report, commented upon the various activities of the year, pointing out that operations during the year ending December 31, 1920—notwithstanding that for the greater part of the first months of the year production had been handicapped by scarcity of labor and income cut during the latter part of the year by a falling lead market—were profitable both from the standpoint of the net returns from ore sales and mine development, and from the fact that the long, expensive and threatening Conkling litigation had been definitely settled by the United States supreme court.

Concerning the future, Mr. Ferry said that stockholders had every reason for an optimistic attitude from the fact that the cost of material and supplies are on the decline, the mine is in excellent physical condition and the new milling plant according to conservative estimate, should be in operation before the snow flies next fall.

Production Figures Given.

Mine Manager M. J. Dailey's report set forth a number of interesting facts relative to operations and the value of ores shipped.

During the year, the average contents of the mine product was per ton: First class ore, lead, 25.31 per cent; silver, 32.04 ounces; gold, \$1.26, and copper, .59 per cent. Concentrates, lead, 24.84 per cent; silver, 20.73 ounces; gold, \$1.28; copper, .25 per cent. Leasers, lead, 26.58 per cent; silver, 37.8 ounces, and gold \$1.80; copper, .91 per cent. The average value of first class ore shipped figures \$55.70 per ton; that of the second class, or mill ore, \$7.93 per ton; leasers' ore, \$63.30 per ton. The second class ore, when treated and sold in the form of concentrates, brought the company on the average of \$43.50 per ton.

Regarding the output of ore and mine development,

Manager Dailey made the following statement:

"The output of the mine for the year 1920 was as follows: Fourteen thousand, five hundred and seventeen and four-tenths tons of first-class ore sold for \$807,862.24, and 25,103.9 tons of second-class ore, producing 4,568.46 tons of concentrates, sold for \$198,825.03.

"Results from leasing operations have exceeded our former estimates, the figures for the year being as follows: One thousand, eight hundred and forty-nine and four-tenths tons of leasers' ore, sold for \$116,957.88; net royalty to the company from lessees' ore, \$36,723.92.

"This ore was extracted from old abandoned stopes which could not have been profitably mined by the company, and from all indications a substantial profit will continue to be realized in our leasing operations for the present year.

Mine Development Reviewed.

"That section of your property known as the M. L. M. has produced during the past year approximately 67 per cent of the total first-class ore mined in the property and 22 per cent of the total second-class ore mined in the property.

"This ore shoot, one of the most persistent and profitable that has ever been opened up in your property, extends beneath the 1300-foot level, and there is now something over 2500 feet of undeveloped territory on the strike of this shoot that should, from all indications, be equally as productive as the section stoped during the year 1920.

"On the 1100 level, in what is known as the Blood cross-cut, the results of our prospecting have been most gratifying. The ore-bearing zone known as the O'Brien fissure has been intersected and developed for some 400 feet along the strike of the vein and very profitable mining operations are now being carried on in this section of the property.

"Along the strike of this system we have over 3500 feet of undeveloped territory, so that the importance of this development is not only the immediate ore now showing there, but the indications of a productive vein system in this territory for the distance above mentioned.

Silver Hill Area Promising.

"Production for the year 1920 in the Silver Hill territory has even exceeded our expectations, this section having produced approximately 17 per cent of the first-class ore and 28 per cent of the second-class ore, as mined in the entire property, and the general indications are now such as would lead us to believe that profitable production can be expected here for a long period of time. In addition to this, the recent decision of the United States supreme court granting to us the extralateral rights along the dip of the Crescent fissure in this section has released to us for mining and development a considerable territory that will mean materially increased production here.

"In addition to the above, there are, of course, numerous smaller stopes in the property that are still being mined profitably, with the chances always present of development into larger bodies of ore.

"During the year 1920 the following development work was completed: By drifting, raising and sinking, 7695.1 lineal feet; by diamond drill, 1279 lineal feet; total, 8974.1 lineal feet.

"We are continuing to follow out our campaign of development work on the so-called McGregor fissure and Massachusetts fault zone with the expectations of being able to develop an ore system in this section of our property. We have also started development work in the so-called Central shaft country to prospect at depth the known mineralized zone, namely, the Whale and Jewel fissures, extending to the southwest limits of the property.

"Ore extraction cost per ton was \$6.95; development cost per foot for 645.6 feet, \$20.18; diamond drilling cost

per foot for 1279 feet, \$3.307; milling cost per ton, \$2.35; sampling cost per ton, \$.422; tramway cost per ton, \$.757."

Mill Operations Reported

Forrest Mathez, superintendent of the mill, shows that 15,987 tons of sulphide ore was milled, from which 65,014 ounces of silver, 1,849,557 pounds of lead and 3541 tons of concentrates were recovered. The ratio of concentration was 4.51 to 1. The recovery of silver averaged 76.8 per cent; lead, 75 per cent.

A total of 9,116.4 tons of carbonate ore was treated, from which a total of 1026.7 tons of concentrates were recovered; 32,804.2 ounces of silver, and 619,600 pounds of lead. Ratio of carbonate concentration was 8.89 to 1; silver recovery, 55.3 per cent, and lead recovery, 60.8 per cent. Average ratio of concentration for both carbonate and sulphide ores was 5.49 to 1; silver saving, 68.1 per cent; lead, 70.9 per cent.

Financial Statement Made

During the year total proceeds from the mine's production was \$1,043,411.19. Other items brought the company's total earnings up to \$1,056,041.35. Total operation cost at the mine was \$594,944.17. Miscellaneous expenditures brought total expense up to \$644,952.15, which left a net profit before depreciation of \$411,089.40. After depreciation charges were deducted a net profit to surplus of \$358,359.61 was left.

The balance sheet of the company's annual report shows that the mine and mill plant and equipment and miscellaneous properties are valued at \$6,359,284.29; reserve for depletion \$545,697.84. Total assets of the company, including treasury and other stocks, are \$152,752.66. Liberty bonds, \$100,100; ore in transit, \$34,472.64; accounts payable, \$11,286.27; cash, \$706,482.22, and deferred charges, \$1389.03, are given as \$6,893,625.27.

Miscellaneous liabilities total \$131,859.53, to which are added capital stock, authorized and issued, \$6,250,000; surplus balance less income tax, \$153,406.13, and profit for year of \$358,359.61.

THE STORY OF WASHOE COUNTY'S BIGGEST MINE

By A. J. Moore.

The Leadville Mines Company is rapidly developing one of the biggest mines in Washoe County, Nevada. It is the Leadville mine forty miles from Gerlach in the northern portion of the county. It was an old producer years ago under the control of John Harnan who was one of the original owners of the Portland mine at Cripple Creek. A decline in the price of silver and lead caused its closing down some years ago a little later the mine passed into the hands of A. A. Codd of Reno. He has developed it to the point where it is now producing, mining and milling thirty tons a day.

The first move on part of Mr. Codd when he secured control was to explore the old workings and then, after some experimental work, to lay out an extended campaign of development. The mine is now to the point where it has a body of ore blocked out as a reserve and prospecting work is being pushed ahead to keep up the reserve.

The mine is operated through the old Harnan shaft and by tunnel No. 3, the portal of which is at the mill site. A winze from the tunnel has been sunk to the 300 foot level and a drift from this winze has at an advance of 250 feet cut into 4 feet of high grade milling ore. This drift is also being pushed ahead to tap the downward extension of ore bodies known to exist on the upper levels. A peculiarity of this mine is that the ore bodies from the 100 foot level down carry about the same values which give promise of their going to great depth. The No. 3 tunnel also connects with the Harnan shaft which expedites mine operations. The

mine and mill now employs twenty-seven men. This number will be increased as required.

The mine is fully equipped with the latest in drills, air compressors, etc., which are operated by wide type Fairbanks-Morse engine, a counterpart of which runs the crusher and mill.

At the mill the ore goes through a Blake crusher to a 54 inch Marcy mill on to a Dorr classifier where it is reduced to 80 mesh. Then to two K. & K. Flotation machines. The concentrates from the K. & K. go to a Dorr thickener and then through the Oliver filterers and moisture reduced to about 12 per cent. The concentrates will then run about 220 ounces in silver and 50 per cent lead. The extraction is from 92 to 95 per cent of values and will run on an average of about \$300 a ton.

Mining operations are under the direction of Homer J. O'Connell as superintendent. Mr. O'Connell was with the Tonopah Belmont as underground superintendent for many years. Later he took charge of some very important mining operations in Canada and on return took charge of operations at the Leadville for A. A. Codd. The positions of responsibility that he has held so successfully bear testimony to his ability as a mine superintendent.

A cook house and boarding house provide accommodations for the men right at the mine. The usual up-to-date blacksmith shop and other surface equipment complete one of the most efficient mine plants in Nevada of its size and requirements. Fuel oil burning boilers are in use. The fuel oil is brought over the Western Pacific to Gerlach where the Leadville Mines Company has a 13,500 bbl oil tank which is about the capacity of a railroad tank car. A 3½ ton White auto-truck is in use between the mine and Gerlach and takes out the oil on its back haul. The truck can make a round trip a day.

With an equipment built for economy and efficiency, a sizeable body of ore already blocked out and much larger in the prospective, and an able experienced superintendent and most capable management, the Leadville Mines Company now has all the requisites for a very profitable mining venture. A. A. Codd deserves much credit for the manner in which he has brought this property to the front and placed it on a paying basis.

HIGHEST AND LOWEST POINTS IN THE WORLD

The difference between the highest and lowest points of land in the United States is 14,777 feet, according to the United States Geological Survey, Department of the Interior. Mount Whitney, the highest point, is 14,501 feet above sea level, and in Death Valley there is a depression that lies 276 feet below sea level. These two points, which are both in California, are less than 90 miles apart. This difference in height is small, however, as compared with the difference in the height and depth of land in Asia. Mount Everest rises 29,002 feet above sea level, whereas the shores of the of the Dead Sea lies 1,290 feet below sea level, a total difference in height of 30,292 feet. Mount Everest has never been climbed.

The greatest depth yet found in any ocean is 32,088 feet, the depth at a point about 40 miles north of the island of Mindanao, in the Philippine Islands. The bottom of the sea at this point is therefore more than 11½ miles below the summit of Mount Everest.

The value of building permits in Los Angeles for March were about \$7,000,000, and in San Francisco about \$3,000,000. That tells one story. Bank clearings in the Bay city, compared with a year ago, decreased 16 per cent. In Los Angeles they increased 20 per cent. That tells another story.

Construction Notes

The city commission of Salt Lake on the 25th approved plans and specifications for the construction of sidewalks in the Farmers ward addition. Bids will be advertised for in the near future.

The Logan and Richmond, Utah, chambers of commerce and those associated with them are making a vigorous canvass of the county in the interest of the road bonds which are to be voted upon on June 7.

The Mountain Copper Company, according to Redding, California advises has decided to build an aerial tram line from the Hornet mine to the Southern Pacific railroad at a point a mile south of Motion, the next station north of Keswick. The tram line will be 12,500 feet long.

The town officials of Kemmerer, Wyoming, now are advertising for bids for the construction and equipment of a sewerage system to cost in the neighborhood of \$15,000. Bids must be in by June 11th. Full details will be supplied by M. S. Reynolds, Clerk.

L. C. Schultz of Boulder, Colo., and J. S. James of Denver, representing the Tungsten Products Company with the Radium Company of Colorado, were in Moab a few days ago on the way to the carnotite claims in Dry valley. It is understood that the Radium company is planning the erection of a mill in Dry valley for handling the vast tonnage of low grade uranium ores.

Construction of a new smoke stack which will carry away noxious fumes from its smelter at Murray has been started by the United States Smelting, Refining and Mining Company so as to make the plant comply with the recent federal court decision in the smelter smoke case. The stack will be 450 feet high, the same as the stack at the Murray smelter. The stack will cost \$150,000 and is being built by the Weider-Hold Construction company of St. Louis.

Construction of the first cyanide unit of the mill for the Candelaria Silver Miner Company will begin at once, according to a statement made by C. D. Kaedling, consulting engineer and manager of the company, upon his arrival in Reno, Nevada, from New York. Machinery with a crushing capacity of 400 tons daily will be installed at once and the first unit of the cyanide plant will treat 150 tons daily and will be completed by the time the electric transmission line from Hawthorne reaches the camp, probably late in August, says the Reno Gazette. The controlling interest in the enterprise is held by the International Nickel Company, one of the largest operating concerns in America, which operated in Dome Mines, Ltd., at Porcupine and other large mines in Canada.

The large coal mine operators of Utah are considering the building of a \$1,000,000 power plant near the coal mines of Carbon county, in order to reduce the cost of supplying the coal mines with operating power, light, etc. It is believed that such a move will effect a saving of at least one-half of present costs. A committee has been named to make investigations, secure data relating to such an undertaking and a report is expected in a short time. Fred A. Sweet, of the Standard Coal Co., J. H. Tonkin, of the Independent Coal & Coke Co., and F. H. Rolapp, of F. H. Rolapp & Co., wholesale coal dealers, are members of the committee named at a meeting of representatives of the operating coal companies held a few days ago.

Around the State

General depression in the mining industry and particularly the suspension of mining operations at Bingham has necessitated closing of the plant of the Hercules Powder company at Baechus on the 25th. Fifty men will be thrown out of work.

It is reported from the Vipont Silver mine in the extreme northwestern corner of the state, that there are now piled up 10,000 sacks of high-grade concentrates, the results of operating the re-stocked mill. The company recently installed electricity at mine and mill.

The Zuma's main shaft at Tintic is 500 feet deep but the workings extend to the 900 level, the additional depth having been reached by sinking winzes. There is considerable ore exposed in the lower levels of the mine and it is thought that the best way to bring the Zuma into the productive stage is to sink the shaft and cut the same deposits at greater depth. This work has now commenced. No changes to the equipment will be necessary.

The second sale of a lease to coal land since the coal leasing bill went into effect on Feb. 25, 1920, recently was made by Gould B. Blakely, register of the local United States land office to Robert Y. Gibson, for a bonus of \$10. The minimum expenditure that is to be made by Mr. Gibson, according to his contract with the government is \$75,000. The government will also receive a royalty of ten cents per ton on the coal mined. The land is located in the vicinity of Seofield, Carbon county, and was designated by the secretary of the interior on the petition of Mr. Gibson.

One of the finest samples of high grade uranium ore ever seen here was being exhibited to friends by Howard W. Balsley, today. The sample, weighing about fifteen pounds, runs better than twenty-five per cent, and is conservatively valued at \$25. Mr. Balsley secured the ore while on a visit to his claims in the Brown's hole section. About forty sacks of similar ore have been mined, all taken from a petrified tree. Mr. Balsley and associates will make a carload shipment of ore from their claims in the Brown's hole and Cane Spring district soon.—Moab Times-Independent, 19th.

Work is to be resumed at once at the Chief Consolidated company's "Water Lily" shaft, which is located about midway between the Central Standard and the North Standard properties in the eastern end of the district. This shaft was sunk to a depth of about sixty feet during 1920. It is understood that \$3,000 to \$4,000 will be spent there during the present year, this sum being required for the annual assessment on the large tract of land which the Chief Consolidated company has in the eastern end of the district. The conflicts between the Chief and other companies of that section have practically all been cleared up and the best of feeling now prevails.

TO MAP REGION NORTH OF SEVEN DEVILS.

Plans for the cooperative mapping of the section north of the Seven Devils quadrangle, known as the grand canyon of the Snake river, by the U. S. Bureau of Mines and the Idaho bureau, have been approved by federal and state bureaus. Two mapping crews, one working under the Oregon and federal bureaus, surveying the part of the area lying in Oregon, and the other, under the federal and Idaho bureaus, working in the Idaho part, will start work as soon as weather conditions permit. Every effort will be made to complete the mapping this summer.

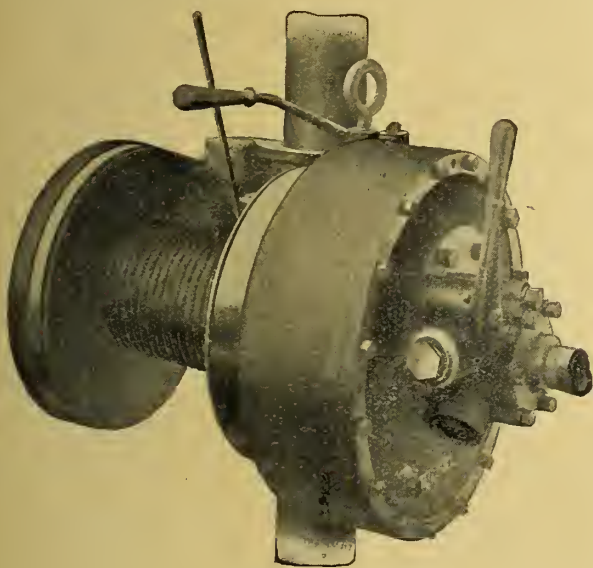
THE LATEST THING IN HOISTS.

In 1858 Ericson's first air hoist was put into service in a New York warehouse and since that time many improvements have been made in air hoist design. But never until the recent appearance of the Waughoist, made by the Denver Rock Drill Manufacturing Company, has the rotary engine principle been embodied in a portable hoisting engine. This new machine promises to add much to the fame of the well known line of mining machinery bearing the Waugh trade mark. It is fully illustrated and described in a booklet just issued by the company. The accompanying illustration is a general view of the compact little machine.

The Waughoist's outstanding feature is its engine, which is of the rotary-reciprocating type and vibrates so little that the machine can be run free at high speed without being fixed to any foundation.

The splash system of lubrication in combination with a force feed to the main bearing is employed in the Waughoist and lubrication is greatly facilitated through the use of dissimilar metals in all bearing and friction surfaces. A steady flow of power is maintained by the fly-wheel action of the revolving spider within which the engine also revolves.

The machine delivers five horse power when shipped



from the factory and this horse power materially increases after installation. No cylinder drainage is necessary because a dead cushion in the Waughoist cylinders is impossible.

The gears are cut from high grade, heat-treated steel. All friction surfaces are ground to a precise size limit instead of being lapped together in the ordinary manner, all abrasives being thus eliminated.

Cylinder leakage is prevented by the use of piston rings. The pistons are extremely light and strong and made of drop-forged, heat-treated, high grade steel, accurately ground and carefully balanced.

The regular gear equipment supplied with the Waughoist has a ratio of 27.5 to 1 but for light loads of 1,000 pounds or less gearing having an 18 to 1 ratio can be supplied.

The whole machine weighs 335 pounds, or 67 pounds per horse power. It will hoist 500 to 2,000 pounds, vertically, at 100 pounds air pressure at the rate of 68 to 143 feet per minute, depending upon the weight of the load, and loads of 500 pounds at pressures as low as 20 pounds. Its drum will carry 1,000 feet of 1/4-inch rope; 465 feet of 3/8-inch rope; and 225 feet of 1/2-inch rope. Its length is 24 1/2-inches

over all, height, 19 1/2 inches over all, and width from center of 4 1/2-inch column 17 1/2 inches.

The utility of this new hoist is by no means limited to the mining industry. It is equally well suited to building, contracting, excavating, foundry work, grading, lumbering, quarrying, ship yard work, and many other fields where heavy loads are required to be lifted.

UTAH COPPER'S QUARTERLY REPORT.

Features of the Utah Copper company's report for the first quarter of the year 1921 are the increases in the grade of ore treated and the percentage of recovery and a net deficit of \$1,714,317.69.

The net loss from copper production was \$53,616.21. Miscellaneous income, including payment for precious metals, made the total income for the quarter \$215,715.83. Loss on government bonds sold being \$305,543.52 the total net loss for the quarter amounted to \$89,827.69. Disbursements to stockholders of \$1 per share or a total of \$1,624,490 made the net deficit for the quarter, \$1,714,317.69. The report follows in part:

The net production of marketable copper derived from gross output, after allowing for smelter deductions, was 22,726,411 pounds, as compared with a net production of 23,943,816 pounds for the fourth quarter of 1920.

The total quantity of ore miled during the quarter was 1,202,700 dry tons, being 144,300 tons less than the preceding quarter. The average grade of the ore was 1.16 per cent copper and the average extraction was 83.87 per cent, as compared with 1.11 per cent copper and 78.89 per cent, respectively, for the previous quarter.

The average cost per net pound of copper produced from concentrates and leaching plant precipitates was 13.18 cents, without credit for gold and silver or miscellaneous income. This cost includes all fixed and general charges, but excludes federal taxes and depreciation. The gold and silver values in concentrates and the miscellaneous income for the quarter combined are equal to 1.19 cents per net pound of copper produced, which, being deducted from the operating cost above stated, results in a net cost of 11.99 cents per pound.

It will be noted that the aforementioned per pound cost does not include charge for plant and equipment depreciation. For some time past, this item has been treated as an operating expense, but commencing with January of the current year it will be considered as a deduction from income.

Effective April 1, the mines and properties of the company were closed down and will remain closed and the production of copper will be entirely suspended until general conditions warrant resumption.

There was removed during the quarter a total of 304,461 cubic yards of capping, being an average of 101,487 cubic yards per month, as compared with 487,358 cubic yards and 162,453 cubic yards, respectively, for the fourth quarter of 1920.

The ore delivery department transported a total of 1,276,461 tons of ore, being an average of 14,183 tons per diem. The Bingham & Garfield railway, operating in its own common carrier capacity, transported a total of 159,411 tons of merchandise freight, or an average of 1771 tons per diem.

"Do you know that I started life as a barefoot boy?" said a merchant who had been rather successful. "Well, I wasn't born with shoes on myself," answered the clerk.

In Nearby States

ARIZONA.

The discovery of \$20 gold ore on several claims in Gold canyon north of the Gila river between Kelvin and Winkelman has caused a small "rush" into the district.

It is estimated that the United American has half a million dollars's worth of rich ore block out. There is real foundation for a small mill. It is believed that ore can be mined and milled in the Goshute district at the present time for \$5 per ton.

Negotiations are reported in progress between the Inspiration Copper Company and the Southwestern Miami Development Company, for purchase of the last named company's properties adjoining the Inspiration estate. Plans and estimates as to ore reserves have been submitted to the Inspiration engineering staff wherein it is estimated there are approximately 4,300,000 tons of copper ore, averaging 1½ per cent copper developed.

BRITISH COLUMBIA

In the first four months of this year the Trail smelter has received for treatment 149,677 tons of ore and concentrates. This is 50,936, or 50 per cent more than in the first four months of last year.

The Ottawa mine on Springer creek, near Slocan City, is another property where the owners are bold enough to renew operations under the adverse prevailing conditions. A. L. McPhee and associates are owners. Work on the new concentrator for the property has been resumed and the plant is so near completion that it will be handling ore within the next month.

Cash in bank and government bonds of the Standard Silver-Lead Mining Company on the last day of last year amounted to \$316,104.17, the company held farm mortgages worth \$56,800, making total assets of \$372,904.17 against which were current bills payable to \$5,780.98, leaving net credit of \$367,173.93 in cash, government bonds and mortgages. This is a statement of the secretary, Charles Hussey, of Spokane, Washington. The company's property is at Silverton, and offices in the Empire State building at Spokane. The annual meeting was held May 2.

"The Silversmith Mines, Limited, has purchased the Ivanhoe mill equipment and mill site at Sandon, from the Minnesota Mining company and purposes to spend \$40,000 in remodeling and enlarging this mill," said John B. White president of the Silversmith company. "This is to give facilities for treating a larger tonnage of ore. Our present mill has a capacity of seventy-five tons daily. The equipment in this mill will be removed to the Ivanhoe mill, which, when the remodeling has been finished, is expected to handle 150 tons, or double what we can now treat. Work on the 41,000-foot tram to connect the mine and new mill is to start shortly."

COLORADO.

B. J. Jeffery, H. E. Decker and C. W. Pollock, who are operating the Mount Kelso property, above Silver Plume, are getting things in shape for an extensive campaign of operation this summer.

Telluride papers announce the closing of the Liberty Bell mine in that section after an operation of nearly twenty years. The property has produced close to \$10,000,000, principally in gold. The company was capitalized for \$667,000 and has paid over \$2,000,000 in dividends.

The Colorado Fuel & Iron Co. has taken a lease on a large acreage of iron-bearing ground on the Apache Indian Reservation sixty miles south of Winslow. It is said that there is a large tonnage of known ore that will average 55 per cent iron.

All necessary machinery for the Chipeta mine has been ordered, shipped, and should arrive in Ouray within a few days. Upon arrival, it will be taken up to the property immediately. When ready to run the mine will be placed upon a complete power basis and development operations resumed on a two-shift basis.

IDAHO.

Work is to proceed without interruption in the Paragon mine in the Murray district of the Coeur d'Alenes, following the death recently of the manager, L. W. Stedman.

The Bunker Hill & Sullivan Company has a large crew of men at work in the mine. The main shaft has been sunk to the 1600-foot level during the last five months and the output of the mine is approximately 1200 tons of run of mine daily.

The high price of silver and the increase in the price of lead are encouraging the mining industry in the Kellogg district of the Coeur d'Alenes, and many of the smaller operators are preparing for extensive development work during the summer.

Stringers of carbonates are being found in the crossect of the Imperial property in the Coeur d'Alenes and the management believes the vein opened in the upper workings will soon be encountered. This is the objective of the work. Some of the stringers run 18 ounces to the ton in silver.

Fred Ruch, a well-known miner of the Coeur d'Alenes, has been placed in charge of operations at the Sidney mine on Pine creek, and will get out a shipment of high grade ore from the surface showing. The property has attracted much attention in the last few weeks.

The Peoples 100-ton concentrator on Milo Creek above Wardner is undergoing extensive improvements and will commence operation within the next month. The entire mill is being repaired, a new set of rolls and a Dorr thickener are being installed.

The recent strike of high grade gray copper ore on the Sterling Silver property on Big Creek practically assures another big silver producer to the district, according to Harry Morrell, manager. The lead was encountered at a depth of 300 feet from the surface on the lower level of the workings.

Some conception of the importance of leasing operations in the Coeur d'Alenes, as well as other districts, is obtained from the announcement that the Bunker Hill & Sullivan company last year received \$69,226.74 from royalties paid by the miners who lease from that company alone. What the profits to the miners are can only be surmised, but they expect to make more than the owners do. Total profits of the Bunker Hill & Sullivan last year were \$2,593,089.17.

Gilmore lead-silver mines still remain the premier producers, and are being put in shape for increased output. Manager D. L. Nichols has a force of men reequipping the Latest Out mine, which suffered severe damage by fire last fall, some of the machinery requiring new parts and reconstruction of buildings made necessary. This work is being pushed and it is probable resumption of ore production will occur about the middle of July.

Extensive improvements are under way at the Jim Blaine Mining Company property on Pine Creek to cost approximately \$2000. The group comprises 27 claims on Pine Creek opposite the Nabob and is one of the oldest properties in the district. Considerable development work has been done, a tunnel 600 feet long was driven in the upper work-

ings and fair lead-silver values were exposed. The Jim Blaine property is owned principally by Kellogg and Spokane interests.

Senators Stanfield of Oregon and Gooding of Idaho, recently appeared at Washington, D. C., with Kavenal McBeth, representing the Idaho interests, before Chairman Wilson of the sub-committee of the house ways and means committee which is considering the tariff on ores. The Idaho mining interests are demanding a tariff on all copper matte containing more than 7 per cent lead imported to this country. The American Smelting & Refining Company is seeking to have all copper matter containing up to 25 per cent lead admitted free of duty. Representatives of Idaho's mines say that such competition would be destructive to the industry throughout the west. Mining associations and chambers of commerce all through the west wired supporting the Idaho position.

MONTANA.

Shipments of ore are expected to be resumed in consequence of arrangements having been made with the Pitts-
mont smelter by the Butte & New England lessees for the treatment of their rock.

Discovery of large deposits of tripolite, a high grade clay, on the Henry Brown farm three miles east of Dillon, has created a great deal of interest in that district and has started talk of new industries.

A large quantity of ore now on the dump of the New Departure mine, twenty miles west of Dillon, is ready for shipment. The management of the property is preparing to have the hauling done by team. Six men are employed at the property.

One unit of the Great Falls smelter and one of the rolling mills at the plant have been placed in operation, according to an announcement in the Electric city. Silver and lead ores are being put through the process, giving employment to 100 men. Other parts of the plant have been closed down, the copper furnace reverberations having been suspended on Tuesday.

Not a wheel of the Anaconda Copper Mining Company has been turning since the shutdown became effective, but with adoption of plans now under consideration employment will soon be given to some 500 men in handling high-grade silver-zinc ores, which will be put through the company's new plant. This will be done more to relieve the "idleness" situation than anything else, although the company will be able to benefit from the dollar per ounce price being paid by the government for all domestic silver produced.

Construction of a portable sawmill to be used in getting out timber for the Glengarry mine at Cooke City is one of the improvements to be made at the property this summer, according to Donald H. Hamilton of Miles City, who left last week for the camp. The work on the tunnel, which is now clearing the main ore body, has been pushed during the winter and for the first time in the history of the mine a large crew of men have remained at the property during the winter.

NEVADA.

A strike of native copper is reported from the claim of G. G. Jackson and located about two miles north of Silver-
born.

The Telephone mine of the Amalgamated Pioche Mines Smelters Corporation, has been leased to Tony Mitsoff and work has already been commenced on this interesting property, situated adjacent to the famous Stindt & Dono-
ue bonanza ore body on the Harney property.

The Bristol mine owned by the Bristol Silver Mines Company still continues to be the principal shipper of the Pioche district. The high silver content of these ores makes their continued extraction profitable despite the low price derived from the copper and lead content.

Mining activities have been resumed at the old mining camp of Vernon and the old Darby mill started operations again, milling ore for the Seven Troughs Mining Company on an old contract which was never finished. The work is under the management of Brook Hartley, mining engineer, who is looking after the Darby interests.

Development will shortly be started on the property of the Stella Mines Company, at Comet. A large tonnage of high grade silver-lead ore has been shipped from the main fissure on the Ronnow and Dorothy claims and dividends amounting to over \$10,000 derived from profitable ore extraction, have been paid to the owner of this property. The owners are Sheriff and Mrs. Culverwell, D. J. Ronnow and the Hybla Mining Company of Nevada.

After a trial which lasted four days a jury in the Lander county district court at Austin returned a verdict of not guilty in the case of Lee Lakin of Tenabo, who was accused of shooting Waddy Hunt after a dispute over some mining ground at Tenabo. The defense was based on a statement of Lakin that he had been beaten once by Hunt and that he shot in self defense when a second beating was threatened.

WASHINGTON.

Republic ores are wanted by smelters for their value for fluxing. For this reason they pay a pretty good price for them.

As a result of the recent placer gold discoveries along Peshastin creek in the vicinity of Blewett, several mining claims have been staked out along the banks of Peshastin and Nigger creeks.

L. K. Armstrong, a mining engineer of Spokane, has just returned from an inspection of the Cleveland mine, in Stevens county. Operations will be resumed in a short time with a few men, adding to the force as required. The Cleveland is eighteen miles west of Springdale.

Freight rates to Republic, reestablished by the Great Northern railway will go into effect at once and immediately some ore shipments will be made. Owners of mining claims in that district are hopeful of a better year than the camp has had in a long time.

J. C. Hammond of Miles, Wash., is driving a tunnel south and immediately above Fort Spokane, where he is confident he will cut the main lead of the Crystal dike of ore.

Richard Marsh, mining engineer and assayer of Spokane, has taken a contract to build, install and superintend a cyanide plant which the Keller Copper company will construct at its property, twelve miles north of Keeler. Mr. Marsh will start construction at once. The cyanide plant will handle at least twenty tons of ore a day, and the company already has a mill with a daily capacity of forty tons a day.

Cerro de Paseo Copper has passed the dividend on its stock. The last dividend was 50 cents, paid three months ago. For eight previous quarters \$1 a share was paid.

It used to be that the saloons were to blame for all the things going on in the world. Now it is the movies.—Los Angeles Times.

Personal Mention

Captain Duncan MacVichie has returned to Salt Lake following an extended trip to his ranch in Montana.

Judge E. V. Higgins was in St. Paul, Minnesota, last week arguing an important case before the circuit court of appeals.

H. D. Mather, a well known mining man of Ogden, has gone into the oilfield regions of Kansas, with Eldorado as headquarters.

Maurice M. Johnson, E. M., recently made a trip of inspection to the oil and asphalt section around the north end of Salt Lake, south of Roselle.

Following a visit with his parents in this city, Dwight C. Bardwell has gone to Reno, Nevada, where he joins the Bureau of Mines staff.

Walter Fitch, Sr., president of the Chief Con. Mining Company has been spending a few weeks in the east on business for his company.

Stanly A. Easton, manager for the Bunker Hill & Sullivan M. & C. Co., has been appointed a member of the State Board of Education of Idaho by Governor D. W. Davis.

Frank T. Snell has resigned as general foreman for the Nevada Consolidated Copper Co., to become associated with the Trojan Powder Co., with offices in the H. W. Hellman building, Los Angeles.

Prof. Waldemar Lindgren, head of the department of mining and geology, Massachusetts Institute of Technology, sailed for Bolivia on May 11. He will be absent on professional business there for about three months.

Earl Havenor, resident geologist for the Tintic Standard Mining Company, was in from Tintic for a day or two during the past week, returning to camp Sunday. He says the Standard mine, great as has been its past record, is still in its youth.

G. L. Bemis, George Baglin, J. R. Walker and C. A. Walker, left on the 23d for the Walker Copper mine in Plumas county, California. It is the intention of the party to remain at the mine several days and make a thorough inspection.

Henry M. Adkinson, well known mining engineer, leaves on the 6th for a month's trip to Chicago and the east. There is to be "a gathering of the clans" of his old university days in Chicago, where various celebrations and reunions are scheduled.

Walter Fitch, Jr., who has been sojourning in southern California with his family during the past several months, has returned to again devote his attention to mining operations. From inquiries how now coming in he is confident that his firm will soon be busy again in the shaft and tunnel-driving business.

W. J. Dooly has been making a round-up of the southern end of the state, investigating various mining and other propositions that had previously been called to his attention. For most part, he reports, he gathered nothing but trouble for his pains. But he intends to keep "scouting," because he is satisfied that prevailing conditions in the mining industry can not much longer prevail.

John Carter Anderson, consulting mining engineer from Tucson, Arizona, is in Pioche on his way to Silverhorn. He comes in the interest of the well known house of Spaeth MacKnight & Co., of New York, to examine the several groups of claims which have been recently acquired by Maurice J. Fink, an old Goldfield, Klondike and Alaska operator.—Pioche Record, 27th.

M. J. Gavin, oil-shale technologist, and L. C. Carriek, assistant technologist of the Bureau of Mines, left on the 21st for Chicago and other points. Mr. Gavin was to address the International Railway Fuel Association on the 24th on the subject of "Oil-shale and its value as a fuel resource." Both gentlemen expected to be absent several weeks.

H. S. Winans, the well known traveling man of Denver, whose name is a household word in all western mining communities was in Salt Lake for a few days last week on one of his periodical visits. Mr. Winans states that the activities in the districts radiating out of Kingman, Arizona, are particularly inspiring, while portions of Nevada and other sections also are making showing which bespeak much livelier times in the near future.

Petroleum Notes

Midwest Refining Co. has been issued building permits for eight more new homes for its employees near its refinery at its Casper works.

Shale oil from the plant of the Monarch Shale Oil Company is to be used in Glenwood Springs in a test on the streets, the company having offered the city 25 barrels of oil for the purpose.

Drilling has been temporarily suspended owing to lack of fuel in the test of the Plateau Oil Co. on section 4-7-86, Chimney Creek field, Colorado. The hole is down 1300 feet and will be completed when road and weather conditions will permit the transportation of supplies.

Pine Mountain district twenty-five miles west of Casper in Natrona county, Wyoming, is to have a thorough testing this summer. Tests drilled by the Pine Dome Oil Co., have proven the presence of both oil and gas in commercial quantities.

It is stated that a standard rig is now being shipped to the west end of the Uinta basin. The first test will be at a point fifteen miles west of Duchesne, where the structure begins, and from whence it runs westward up Strawberry valley a distance of about twenty miles.

Several companies, now formed or in process of organization, in addition to the Hill Creek Oil and Refining Company, are reported to be planning development operations on the Hill Creek dome in Uinta county. The Hill Creek company will ship in a rig as soon as the roads are passable.

According to dispatches from the coast the Shell Oil Co., of California has, within the past few days, struck oil within the corporate limits of Long Beach. Oil commenced to appear, it is reported, at a depth of 2,745 feet. Land values have jumped and leasing right are commanding big prices and much drilling is to be done.

The marketed production from the Cat Creek field is now averaging about 3500 barrels a day of which about 3000 barrels is run down through pipe lines to Winnett and 500 barrels is used for fuel in the field. It is expected that the Montana Pipe Line Syndicate will have its 6-in. line from the field to Winnett in operation early in June when it will be possible to handle the entire output of all the wells that are now completed.

Recently the Consolidated San Juan Petroleum Co. was organized in Salt Lake for 1,500,000 shares, \$1.00 par, to take over valuable oil land holdings in the San Juan, Utah, section. A. H. Spencer, Bluff, Utah, is president; Nephi A. Anderson of Salt Lake, vice-president; W. P. Pratt is secretary and Treasurer. O. W. Kunrow and T. N. Whitford are additional directors. This company has acquired 1920 acres on land in the San Juan field on which there are several producing wells and a deal is now pending for more than a

ousand acres belonging to the London and San Juan Oil company whose holding are considered among the most valuable in that section.

At this writing it looks as though the Ohio company's well at Huntington is on the verge of being brought in. It has been drilled to a depth, it is reported, of 2,500 feet, and the management is anything but discouraged with the prospects. Good reports are also coming from the Circle Bluffs and Caineville wells. The situation has become tense all around. Utah's promised oil boom now hangs in the balance. It will likely be on and under terrific momentum or "busted"—within the next sixty days.

The gasoline needs of southern San Juan county, Utah, are being partly supplied from several of the old holes drilled in the Bluff field ten years ago and which still yields a considerable quantity of crude oil. A small refinery is located on the ground. Last week there was a shortage of gasoline at Blanding and as a quantity of gasoline was urgently needed, three barrels of crude oil were pumped from an old well, taken to the refinery and the following day a barrel of gasoline was on hand to supply the pressing needs of the town.

COAL NOTES.

Two bills relating to the coal industry, one authorizing the interstate commerce commission to institute seasonal rates and another authorizing the secretary of commerce to investigate the production and distribution of coal and the cost and profits of mining and selling, were reported to the U. S. Senate on May 17th by Chairman Frelinghuysen of the interstate commerce sub-committee.

Articles of incorporation were filed with the secretary of state's office May 28th by the Sun Coal Company, of which Paul S. Ray is president; H. C. Kochler, vice president and L. P. Van Voorhis, secretary-treasurer. The company has a capital stock of \$10,000 in \$1 shares.

The Gordon Creek Coal Company is a new concern with a capital stock of seventy-five thousand dollars. The site of the proposed camp is about eight miles up Gordon creek. George A. Storrs is promoting the new company.—Price (Emery County) Sun.

OIL SHALE RETORTS NOT YET COMPLETED.

The Brown retorts of the Index Shale Oil Company, in the DeBeque district in western Colorado, which have been under construction for some time, are not yet completed. This is a very pretentious plant which it is stated will cost when completed \$150,000. Owing to bad weather conditions during the spring it has been a much slower job to get the work finished than was expected, but construction is being hastened as a large force of men are at work on the property.

The Brown retorts are somewhat different in device from any others being constructed or operated. They consist of horizontal cylinders which revolve over the fires. An experimental demonstration plant was erected last year at Newark, New Jersey, which operated so successfully that the management feels confident that the desired results will be obtained in the large retorts now approaching completion at DeBeque.—The Shale Review.

Samuel Untermeyer says there is a \$3,000,000 bathtub trust in the United States. And the bathtub interests refuse to worry. They claim to have a clean record.

ONTARIO SILVER MINING ISSUES REPORT FOR 1920.

The report of the Ontario Silver Mining Company for 1920 states that an extensive campaign of development is planned for the Park City producer during the year 1921. Due to improved labor conditions, General Manager Ernest Bamberger says in the report that he feels that the work planned will be carried out more economically and more speedily than during the past year, when labor was scarce. Opening of the lower levels will be carried on. To that end the company has installed considerable modern pumping and electrical equipment.

The financial statement of the company for the year ending December 31, 1920, states that on January 1, 1920, the company had on hand in cash and bonds, \$465,456.11. Receipts during the year from ore sales were \$551,369.04. Rents, royalties, miscellaneous receipts and interest and dividends brought total receipts to \$585,180.16.

Disbursements for mine labor and salaries, supplies, power and other expenses totaled \$426,854.31. Stocks and bonds, which, the reports states, have been carried above the present market value, are set down as \$623,781.96; cash in bank, \$40,765.13; bankers' acceptances, \$24,436.93 and, bills receivable, \$41,434.28.

General Superintendent N. A. Dunyon's report shows: Development work, not before practicable because of shortage of labor, has been resumed in the past two months. During the past year exploration work included 3799 feet of drifting, 1238 feet of raising, fifty feet of sinking and 2250 feet of cleaning out and retimbering.

The 400-foot level has been reopened to the Ontario No. 1 shaft and is being continued to the east toward the great fault. On the 600-foot level a drift is being run for prospecting the Daly fissure. Prospecting on the Ontario fissure is in progress on the 1300-foot level and also on the 1800-foot level. In the past year the 2000-foot level, the lowest level of the mine, has been unwatered after twenty years. A pump has been installed, works have been cleaned out and retimbered, and preparations are going forward to tap, from this level, the ore bodies of the 1800-foot level.

SPIRIT ORE PROPOSITION FINANCED.

Jack Creighton, a former business man of Elko and one of the best known mining men in the state, says the Elko Nevada Free Press, has announced that his company will soon erect a mill and reduction plant on the property in the Lynn district at a cost to exceed \$125,000. Creighton has a reputation for being a shrewd mining man, and his endorsement of the Lynn district is attracting attention from very important quarters.

Some weeks ago Creighton incorporated his property, taking in eastern capital, the company being known as the Spirit Ore Porphyry Gold Mines company with Dr. B. E. Koering of Salt Lake City as president. At that time it was known that extensive plans were being made, and the president went east to interest capital. Today Mr. Creighton received a telegram stating that sufficient funds had been raised to finance the property and erect the mill.

The mill will be built to handle the peculiar ore which this district produces, and in addition there will also be erected a chemical plant to handle the several valuable by-products found in the ore, making the ore especially productive after the gold has been extracted.

According to Mr. Creighton, work will be started as soon as possible, probably the coming summer, and he is very confident that the Lynn district will be another producer such as Jarbidge.

NEW OIL SHALE PLANT FOR DEBEQUE, COLORADO

County Commissioners Gust J. Johnson, Charles S. Stone and C. A. Wallace, with J. H. Bertholf, road supervisor, visited DeBeque recently on a trip of inspection to note the road and other conditions in the eastern part of the county, and decide upon new work to be done this summer on the Wallace creek road, says the DeBeque Oil and Shale.

They visited the Ginet plant of the Monarch Shale Oil Company and were very much interested in the enterprise being shown by Ginet interests. On Wallace creek considerable work will be done to put the road in first-class shape for heavy hauling.

The Hotalling Estate company of California, which has large holdings of oil shale deposits near the head of Wallace creek expects to erect a large oil-making plant on its property this summer and will have much heavy machinery to haul up the creek.

Last year, the Hotalling company cooperated with the county in bearing a part of the road-building expense, Chairman Johnson stated, but considerable additional work must be done this spring. A number of the bridges need repair and strengthening, and this visit of the commissioners is for the purpose of deciding on the details of the work.

Machinery for the Hotalling plant has been manufactured in the east and advices received here have been to the effect that it will be shipped west in the near future. While DeBeque will enjoy the advantage of being the nearest town where the Hotalling company can transact business, shipment of the machinery will be made to Una, a siding eight miles east of DeBeque on the D. & R. G., there being a good bridge across the river convenient to the place of unloading.

It is understood the Hotalling plant will be of large capacity and that when fully complete will represent an investment of \$2,500,000. The company owns the rights to a refort process that will be used, and probably will ship the oil manufactured to California for refining. Some time ago a Stockton, California, paper stated that negotiations were under way to secure a refinery site for the Hotalling interests near that city.

Several buildings have been erected by Hotalling company at the site up Wallace creek where the plant is to be located, and other buildings that will be needed are to be erected this spring. It is stated by persons who have visited the camp that the buildings erected are of very substantial character, and that the others will be of the same kind. Several branches of Wallace creek on the holdings will furnish an abundance of water for all purposes.

GOVERNMENT AUCTION OF OIL LANDS.

The Department of the Interior has announced the sale at public auction under section 17 of the oil-leasing act, of 6,480 acres of land in the Salt Creek oil field of Wyoming. The sale will be held at the United States Land Office at Douglas, Wyoming, on June 15, 1921. The lands have been divided into blocks of 160 acres each and consist of sixteen "inside" tracts in the highly productive area and twenty-five "edge" tracts, each having an approximately equal value. The tracts will be sold to the bidder who offers the largest bonus. No one person, association, or corporation may purchase more than 640 acres. A base royalty of 33 1-3 per cent on the oil produced is fixed on the "inside" tracts, and of 25 per cent on the "edge" tracts. The base royalty fixed by the Secretary of the Interior on December 20, 1920.

One-fifth of the bonus must be deposited in cash or certified check by the successful bidder on the day of the sale, and the remaining four-fifths must be paid in four equal quarterly installments, subject to the condition that the

successful bidder deposit bank certificates of deposit, liberty bonds, or corporate surety bond in the amount of the deferred payments.

NEVADA CON. REPORT FOR FIRST QUARTER.

Operating loss of the Nevada Consolidated Copper company for the first quarter of 1921 was \$112,424.06. Miscellaneous income was \$105,789.90, which reduced the net operating loss to \$6634.16.

Production of copper was 9,046,682 pounds or an average monthly production of 3,021,360 pounds. The ore carried 1.49 per cent copper as compared with 1.51 per cent for the quarter preceding. In addition to the ore milled, 5459 tons of dry ore from the Ruth mine, averaging 10.92 per cent, were smelted. No custom ores were treated during the quarter.

On May 1, due to the unfavorable condition of the copper market, the mines and properties of the company were closed down.

The cost of production per pound of copper for the quarter, including all fixed and general charges, but not including federal taxes and plant and equipment depreciation, was 13.84 cents per pound as compared with 16.85 cents per pound similarly computed for the previous quarter.

These costs do not include credit for gold and silver or miscellaneous earnings, says the report, which, for the current quarter, amounted to 1.17 cents per pound of copper, and for the previous quarter 1.33 cents per pound of copper, which, being deducted from the operating costs above stated, results in a net cost of 12.67 cents per pound for the current period, as compared with 15.52 cents average for the preceding three months.

ORE SHIPMENTS.

Ore shipments from the Park City district for the two weeks ending on the 27th amounted to 2644 tons, with the Silver King Coalition out of the list during the last week, owing to the trouble existing with the smelting company over the smelting contract. The contributors were as follows:

Silver King Coalition.....	766
Judge Allied Companies.....	1,022
Ontario Silver Mines.....	856

Shipments from the Tintic district for the same period amounted to 247 carloads, as follows:

Chief Consolidated.....	77
Tintic Standard.....	80
Eagle & Blue Bell.....	16
Dragon Consolidated.....	20
Swansea.....	7
Iron Blossom.....	12
Iron King.....	11
Victoria.....	7
Colorado Consolidated.....	9
Alaska.....	1
Gemini.....	3
Enreka Bullion.....	1
Little May.....	1

Shipments from the Pioche district have been holding slow for several weeks, with Bristol Silver and Black Metals as the only regular contributors. The former shipped 315 tons and the latter ninety-five tons. Smelting conditions and the suspension of shipments by Prince Consolidated during the sinking of the main shaft, together with Virginia Louise's cessation, makes it appear as though the camp had almost gone out of business; but reports indicate that everything is in good shape at the mines and when conditions warrant, the output will be larger than ever.

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SECOND-HAND MILLING EQUIPMENT WANTED.

We would like price, description, weight, and where same can be examined, on the following second hand equipment: Jaw rock crusher, 25 tons capacity to 1½-in., complete with pulley, give speed; one 4x4 or 4x6 ball mill; one 75 kw. 400 volt generator, 900 R. P. M., 3-phase AC, 60 cycles; one 30 H. P. motor; one 15 H. P. motor; general equipment for 25 ton, all-slitting cyanide plant.

WALTER HOVEY HILL,
Stanley, Custer Co., Idaho.

FOR SALE:—Coal property in Palisades District twelve miles from Grand Junction, Colorado,—120 acres patented land, three fourths mile from Rio Grande tracks. Main Cameo vein is seven feet thick and mine is partly developed. Good quality of coal. Mine described as Hall Mine on page 77 of Bulletin 510 of U. S. Geological Survey. Will sell for less than 10c per ton in the ground.

Address—WM. A. MARSHALL, Austin, Nevada

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THE SALT LAKE MINING REVIEW

The Chinese people are the most patient people in the world. They can do one little thing ten thousand times a day all their lives, and remain tranquil. Most men "blow up" under the strain of monotonous tasks.

TUNGSTEN IN 1920.

Not since 1902 has the United States produced so small a quantity of tungsten concentrates as in 1920, according to Frank L. Hess of the United States Geological Survey. The Wolf Tongue Mining Company and the Vasco Mining Company of Boulder, Colorado, were the only American tungsten miners. They produced an equivalent of 216 short tons of fereberite ore carrying 60 per cent tungsten trioxide.

Tungsten is most used for making high-speed tools for cutting steel, so that the demand for tungsten ores rises and falls with the steel business. In 1920 the steel business was very dull and the demand for tungsten was correspondingly small.

At the same time, in spite of the small demand, the imports were rather large for peace times, and consisted in part of very cheap ore from the shallow placers of China. A good deal of the ore was apparently shipped to this country with the expectation that a heavy duty would be imposed on it and that ores in stock would accordingly increase in value.

The imports for 1920 were 1,740 long tons of ore, probably averaging 65 per cent or more tungsten trioxide, and were equivalent to about 2,111 short tons of concentrates carrying 60 per cent tungsten trioxide. Of this quantity 1,386 short tons of 60 per cent

concentrates was shipped from China and most of the rest from South America.

Besides the ore 1,997,719 pounds of tungsten and ferrotungsten was imported, equivalent to about 2,250 short tons of 60 per cent ore, and probably more than enough to supply the needs of the high-speed tool industry, so that there was added to the already large stocks in this country somewhat more than the quantity of tungsten represented by the imports of ore.

Exact figures are not at hand, but a large quantity of tungsten ore is in stock in this country, probably more than a three years supply at the average consumption before the world war.

SELENIUM A RARE ELEMENT.

Selenium is a rare and little-used element described by the U. S. Geological Survey as having its greatest use in giving a red color to glass, such as that used on railroad signal lights, and in coloring enameled ware red. It is also used to overcome the natural green color of ordinary glass. Selenium is peculiar in being a very poor conductor of electricity in the dark and a fairly good conductor in the light and is used in several electrical devices whose utility depends on this peculiarity. It has been used in telephoning along a ray of light and in transmitting sounds and photographs from one place to another over a wire.

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DL. 23 NO. 5

SALT LAKE CITY UTAH, JUNE 15, 1921

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Geology of Silver King Consolidated

By J. J. Beeson*

My examination of the geology in the Spiro tunnel of the Silver King Consolidated Mining Company at Park City, Utah, was made between April 8 and April 14, 1921. I have no time during my experience in the examination of mines visited a property where more careful work has been done, not only in the engineering, but also in the collection and recording of geologic data. As for the Spiro tunnel, I believe that it is one of the finest pieces of engineering and mining work that has been done in the west.

The tunnel is now in a distance of about 14,350 feet and from its position it is very obvious that it would be the opportunity be offered, other properties could operate through the Spiro tunnel to the mutual advantage of all parties concerned.

General Geology

The chief events of the past that appear to have had an important bearing on the general and structural geology may be summarized as follows:

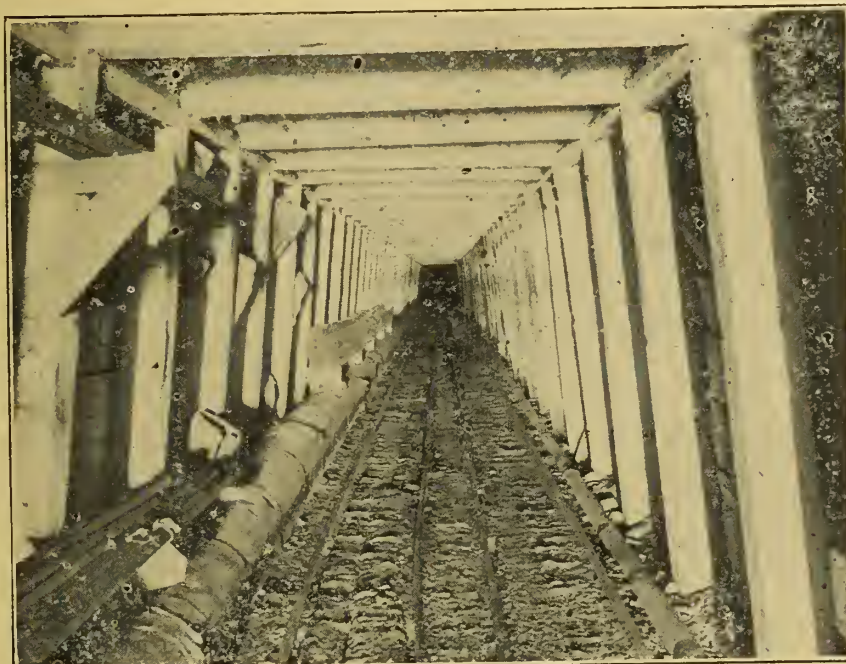
Since the close of the Cretaceous period, during intermittent intervals, the Wasatch mountains have been elevated. Probably during the early part of this elevation, great pressure was developed which exerted its maximum force in an easterly and westerly direction. As a result of this pressure gentle anticlinal and synclinal folds were developed in the vicinity of the present Park City mining district, while farther to the west, in the vicinity of the Little Cottonwood mining district, certain structural conditions weakened the strata and great overthrust faults occurred.

Following the period of folding and faulting just mentioned a zone of weakness was developed by deep seated forces, extending across the State of Utah in an east-west or slightly northeasterly and southwesterly direction. The easterly extension of this zone of weakness is marked by the Uintah mountain uplift, while to the west of Park City it

is indicated by a series of great stocks, dikes and masses of diorites, monzonites and closely related igneous rocks.

Between Park City and Alta these rocks are exposed on the surface in a continuous belt some two miles in width and below the surface this belt of igneous rocks probably connects with the Little Cottonwood stock which extends from Alta to the mouth of the Little Cottonwood canyon. Still further to the west the same zone of weakness is suggested by the northeasterly-southwesterly dikes and masses of igneous rocks that cut the Oquirrh mountains near the head of Bingham Canyon.

Along the borders of the intrusive igneous masses in some localities the sedimentary strata appear to have made room for the intrusives with but little deformation, but for long distances along the borders, especially in the Little Cottonwood and Park City districts, there has been a marked doming of the previously formed structures. Thus in the vicinity of Park City the anticlinal and synclinal folds have apparently been tilted to the north. This folding and tilting, in my opinion, is largely responsible for the position of the Park City limestone in the Spiro tunnel.



Portal of the Great Operating and Drainage Tunnel of the Silver King Consolidated Mining Co., Park City.

There is a possibility that there has been some faulting between the Spiro tunnel and the most westerly workings in the Silver King Coalition property, but considering the direction of the average dips that have been taken during the driving of the tunnel it does not appear to be necessary to assume that this has been the case in order to explain the relative position of the Park City limestone in the two properties.

Park City Formation Above Tunnel Level.

In any event the structure indicates that the Park City formation will be above the Spiro tunnel to the most southerly and westerly limits of the property in the zone where the greatest amount of mineralization should occur. This will be the case unless there has been faulting beyond the

present face of the tunnel. Ore bodies in this vicinity are typical silver-lead replacement deposits in the limestone, and the character of the formation appears to be the controlling factor in the deposition. Furthermore, it is an established fact that similar silver-lead replacement ore bodies occur in the limestones in the Cottonwood districts, stratigraphically thousands of feet below the Park City formation, where there is evidence indicating that the deposits formed at much greater depths below the surface than any of the deposits of the Park City district yet explored.

From indications I have observed in the Park City and Cottonwood districts there is good reason to believe that the full adjustment of the strain along the zone of weakness heretofore described was not completed with the intrusion of the igneous masses, but continued to manifest itself by fissuring and fracturing during and following the solidification of the magmas. In attributing the fissuring to the adjustment of a strain along the zone of weakness rather than to the local conditions and local strains set up by the cooling magmas, I wish to make it clear that my belief is based on actual findings rather than a merely arbitrary belief or idea.

Strike of Mineralizing Fissures.

For instance, in the mines I have studied along the intrusive masses the fissures are almost invariably parallel to the general course of the intrusive and the zone of weakness, or else they could have easily developed as a resultant of the forces that caused the main fissuring. Thus the main mineralizing fissures strike from due east-west to about 50° east, while the majority of the minor fissures vary in strike from north 15° east to north 35 degrees east. Fissures formed before the cooling of the large magmas to great depth are often filled with porphyry dikes and have no commercial value so far as the formation of ore deposits are concerned. On the other hand, still later fissures are often observed traversing not only the larger masses of igneous rocks, but clearly cutting through the porphyry dikes and sedimentary beds for great distances along the border of the igneous rocks.

Some of the earlier fissures and many of the later ones have served as the outlet, or channels through which the mineralizing vapors and solutions coming from the deep-seated magmas have found their way toward the surface. In some of the fissures ores have been deposited in the fissures themselves to the extent that commercial ore deposits have been formed within the walls of the fissures regardless of the enclosing wall rock through which they pass. In general, however, many fissures traverse formations and show little or no signs of mineralization, but in certain limestone stratum, there is an extensive replacement of the limestone on both sides of the fissure by silver-lead ores. It is this latter occurrence that is to be expected in the Park City limestone above the Spiro tunnel where work is now in progress.

Geological Conditions in Tunnel Favorable.

The Spiro tunnel at the portal was started in the gently northwesterly dipping strata of the Thaynes formation and has passed successively through the Thaynes formation, the Woodside shale, the Park City formation and into the underlying Weber, or Ontario, quartzite. The Park City formation traversed by the tunnel is shown to have a thickness of about 800 feet and, inasmuch as the last 1600 feet of the tunnel has been driven in the Weber quartzite underlying the Park City formation it is very evident that the Park City formation is above the tunnel for this distance. It seems quite reasonable to suppose that this formation will remain above the tunnel level to the southeasterly and westerly limits of the property to the south and southwest of the quartzite-limestone contact projected from the point that is cut in the tunnel.

As far as the geology in the Spiro tunnel is concerned

I do not see how a more favorable set of conditions could have been hoped for because, from present indications, the Park City formation passes above the tunnel level at about the northern limit of the zone where the most productive fissures may be expected, and thus any ore bodies that are formed by the fissures to the southeast of this point will be above the tunnel level where economic mining operations can be carried on.

In my opinion the fissures show as much mineralization as is ordinarily shown in the quartzite by fissures that make replacement ore bodies in the limestone.

I consider some of the fissures, especially the one in the Iron drift, and also the one on the 175-foot level from the Contact raise, very promising fissures considering the formation that they are exposed in. Also the fissure in the Porphyry raise, though not as strong or as well mineralized as the other two fissures, it still appears to be a good prospect in view of the fact that it is so near the porphyry dike. To the south of the porphyry dike three good looking fissures have been cut by the tunnel, but in my opinion some of the best fissures are still to the southeast of the face of the tunnel.

Showing in the Iron Drift

One of the best showings of mineralization encountered in the driving of the Spiro tunnel is now exposed in the Iron drift where there is an abundance of pyrite and vein-quartz. It appears that the larger portion of this mineralization has come from solutions that came up through a well-defined fissure which is visible in the top drift at several different places. The pyrite, occurring as it does in the quartzite, is almost identical with other similar occurrences I have observed in other mines along the fissures in the quartzite just below a silver-lead ore body in the limestone.

Contact Raise Prospects

In the 175-foot level from the Contact raise there was at the time of my examination a very promising showing of ore for some twenty feet along the drift near the face. The ore was high-grade silver-lead and copper sulphide together with varying amounts of pyrite and zinc blend, occurring in a zone of fracturing and fissuring in the Weber quartzite. After mapping the fissures and seeing the results of further work it appeared that the mineralization came from one, or perhaps two, well defined fissures.

The most promising appearing fissure was selected and a raise is now being driven upward along this fissure toward the Park City limestone. In both strike and dip the fissure is similar to some of the main ore-bearing fissures of the district. This, together with the high-grade ore that has already been encountered along the fissure in the quartzite, gives promise to the chances of getting larger deposits in the Park City limestone above.

Porphyry Raise Work is Commended

The Porphyry raise has been following a well-defined fissure in the quartzite. The fissure has shown seams of pyrite as thick as four inches at different places in the raise. Some galena, also, has been present in some of the small seams and fractures in the quartzite close to the fissure. The proximity of this fissure to the porphyry dike in about the same relation as the fissure and porphyry dike just below the Cavanaugh stopes in the Silver King Coalition mine, has given this piece of development work more promise than it would derive from other factors alone. From present indications it appears quite probable that the raise will have to be driven at least 250 feet before the limestone is encountered.

In view of this fact and the possibility of getting into the Park City limestone at a lower elevation on the south side of the porphyry dike a crosscut, or crosscuts, driven at intervals from the Porphyry raise through the porphyry dike, would be good prospecting.

NEW CAMP OF WEEPAH LOOKS GOOD.

By Fred L. Miner.

Tonopah, Nev., June 13.—Mining interest in southern Nevada is now centered around the new camp of Weepah, near Lone Mountain, about thirty miles south of Tonopah, because of the development of what now promises to be one of the biggest free milling gold propositions that has come to notice in Nevada in many years.

A vein which has been proven to be more than 70 feet wide by crosscuts at a depth of 75 feet and carrying evenly distributed values ranging from \$12 to \$20 per ton in gold across the entire width and in a number of prospect shafts by which the vein has been opened for a length of about 2000 feet, forms the nucleus of the growing activity in prospecting and location work that now covers a wide area around the main discovery.

The property was recently secured from the original locator by Frank E. Horton of Oakland, Calif., who was one of the prominent pioneer mining men of Goldfield. Horton interested a number of Oakland and San Francisco capitalists and organized the Electric Gold Mines Company, by which the operations are now being conducted. On this property the vein is in schist and the values almost exclusively gold, but the formation in some other portions of the district is lime or lime and schist, and silver values seem to predominate so far as present development demonstrates.

The veins are strong quartz ledges with a general north-south course, many of the massive quartz outcrops being twenty to thirty feet wide.

The remarkable feature of the Horton property is the uniformity of the values across the 70-foot vein and in every prospect hole in which the vein has been opened. Mine sampling over wide sections give from \$12 to \$20 per ton, and "pannings" demonstrate that the values are evenly distributed, every panning made yielding a good showing of gold, with but little variation.

Occasionally a panning will indicate up to \$100 per ton for the individual sample, and one sample taken by a Tonopah assayer who visited the property ran over 18 ounces gold and 26 ounces silver, or a total of \$393 per ton. Such results are not, however, considered in connection with the general average.

The ore is ideal for milling purposes, being what is known as "sugar" quartz, easily crushed, and the gold being free.

A good camp including boarding house and living quarters for a large force of men has recently been established, and complete mining equipment, consisting of gasoline hoist and an air compressor, together with necessary buildings, installed.

A vertical working shaft is now being sunk with two shifts, and has reached a depth of about 85 feet. A station will be cut at 100 feet, and the shaft continued to 200, where lateral development will be inaugurated. Specimens showing free gold have recently been appearing in the ore broken in the bottom of the shaft, which may indicate that the values will become richer with depth, but \$12 to \$20 per ton across 70 feet is the present basis of calculation from a milling standpoint.

The showing is so strong and consistent with present development that early construction of a mill with several hundred tons daily capacity has been decided upon if the values still hold, as expected, at the 200-foot level.

The nearest adequate water supply now known is about five miles distant, from which the water must be piped, but the main transmission line of the Nevada-California Power Company crosses the country within less than three miles of the property, so electric power can easily be obtained.

Among the most prominent men who have recently acquired other property in this district are J. Cal Ewing and Frank M. Ish, principal owners of the Oakland baseball club of the Pacific Coast League, and local mining men and prospectors are becoming exceedingly active and enthusiastic over the outlook for developing a very important new camp in Southern Nevada, where "ore" and not "imagination" will predominate in the output.

SUBSTANTIAL STRIDES MAKING IN OIL SHALE, MINING AND EDUCATION

J. H. Galloupe, inventor of the process for the extraction of shale oils bearing his name, reports from Mack, Colorado, that he has recently completed four retorts for the Western Shale Oil Company which are scheduled to be placed in continuous operation around the 15th of the month. Mr. Galloupe also states that he has commenced the installation of another plant, west of Watson, Utah, for a company represented by R. L. J. Davis of New York, whose offices are in Salt Lake, in association with R. S. Collett of this city.

The Galloupe plant at Dillon, Montana, has recently been placed in operation under the management of M. W. Lottridge, a well known business man and financier of Montana and South Dakota.

Discussing various phases of the shale oil extraction and refining business and other pertinent features of the oil shale industry, Mr. Galloupe says:

"We are accustomed to hear much pertaining to the enormous losses in refining shale oils, due to the unsaturated compounds. The writer has succeeded in refining methods that preclude any loss whatever from the above cause, and has systematically tried out the product covering a period of several weeks, using it in the motors of the Western Shale Oil Company with high efficiency throughout, giving approximately ten per cent more power, and consequently more mileage than is secured from filling station products. It has been determined that the color and physical propensities of the recently distilled shale motor spirit can be very economically stabilized, without the use of either sulphuric acid, or caustic soda, as required in refining earth petroleum.

"As a matter of fact, the refining of shale products will eventually be accomplished under entirely different methods than those followed in petroleum refining, due to the fact that the chemical constituents are far different—chemical re-agents that will do the trick nicely for one will fail if used for the other; hence, new refining regulations will obtain, and who knows but that the cost will be less than former practices have led us to believe?

"While it is a fact that the low present price of crude oil has had a deterrent effect upon the shale industry, it is the opinion of the writer that activity will not be seriously lessened on that account, and that most companies who have reached a point well along in their construction will proceed nevertheless.

"The financing end of the situation is the more serious due to the stringency of the money market; however, those who have started upon a firm footing will get through, in my opinion.

"As long as the price of gasoline remains near the present quotations, there is a probability that the shale oil producer will be able to slightly crack the crude into gasoline, and perhaps pay therefrom the entire operating cost, holding the heavier stocks for future demand."

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News Stand, D. A. Callahan, Salt Lake City.
News Stand, 237 South State, Salt Lake City.
News Stand, White House News Stand, Salt Lake City.
A. J. Moore, P. O. Box 2041, Reno, Nev. Western Representative.

The Mining Review isunavoidably late again, as a result of the printers strike. We have assurances that the next issue due on the 30th, will not be so far behind.

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*Illustrated.

The author of "My Adventures with Your Money"—George Graham Rice-Herzig—has decided that Reno and San Francisco "sueker" streams no longer offer the sport they have provided during the past two years or so, and he therefore has decided to make his "home" in Salt Lake and try his luck at "angling" here, once more. If George don't "hook" you, that's HIS fault. If you become mesmerized and gobble his "bait," hook, sinker and line—why, that's YOUR fault. He has opened offices and now is reported to be manipulating the wires behind the "smoke screen" in front of which his "army" of brokerage hientenants will feed the hungry public with 467,000 shares of Bingham-Galena stock at prices fixed by General Rice from day to day.

EVIDENCES OF REVIVAL IN METAL MINING

While in San Francisco only a few days ago ex-Senator Wm. A. Clark of Montana, declared that a revival in the copper metal mining industry would be pronouncedly manifest during the next three or four months. Senator Clark understands the ramifications of the copper situation probably as well as any man in the world—and he is not a man who parades his knowledge, nor one who talks simply to listen to his own melodious voice. Therefore the mining west can take heart on the strength of his declaration.

Another healthy evidence that the copper mining industry is about to enter another long period of activity is found in the recent order of the Pacific Gas & Electric Co. for copper wire, an order that will require twenty-seven railroad trains to haul. This wire, it is said, is to be used in the construction of electric power and light lines reaching all through the northwest, from California to British Columbia; and its utilization also involves the construction of many hydro-electric power stations, some of which will compare with the largest in the country. This is one feature of the copper situation which evidently prompted Senator Clark's prediction. Others will undoubtedly become public as the weeks go by. The copper mines, mills and smelters of Shasta county, California; the great plants of Montana, Utah, Arizona, New Mexico and elsewhere, are all being groomed for the boom which nothing can hold in check very long, and that wise old sage, Senator Clark, knows it.

Silver, lead and gold mining enterprises are gradually awakening from the lethargic condition that has prevailed in them for two or three years and, with the inevitable readjustment of freight rates and smelter charges, they are ready to "go." Conditions are constantly improving in Idaho, Nevada, Arizona Colorado and Utah—a statement that finds foundation in fact in the better reported condition of the machinery and equipment business which caters to the mining trade, while prices are all favorable to the buyer. On the first of the month one of the great blasting powder and high explosive concerns—The Hereules—announced a reduction of \$25 to \$35 a ton on explosives most used in mining and the trend everywhere seems to be in line with encouraging and supporting the metal mining revival which is coming along faster than many of us appreciate.

STRIKE REPORTED IN EUREKA UNCLE SAM

Eureka, Nevada, June 12.—It is reported here that the Eureka Unele Sam has advanced its tunnel into the ledge that outcrops on the surface near the newly acquired Hamburg ground and values running into shipping grade have been struck. Assays have not yet been taken but as free gold shows it is to be assumed that values will go pretty high.

Just beyond is the ground from which ore of phenomenal value was taken in the early days of the camp. In fact some of the richest ore found in this district was taken from the Hamburg ground just ahead of the face of the Uncle Sam tunnel. Assay returns from this find are being awaited with interest.

American Smelting's action in passing the common dividend marks the first break in regular payments on the junior issue since 1904. Due to curtailment by many of the companies which smelt their ores at American Smelting plants, and to the closing down of most of the company's own companies, profits are light. The shutdown of the Ray and Chino copper mines has completely closed the Hayden and El Paso copper plants, and the tonnage of the Garfield plant is now less than 25 per cent of what it was prior to the shutdown of the mines of Utah Copper.

ARIZONA MINERAL REGION IS A**"SILVER BOW WITH GOLDEN STRING"**

By William P. DeWolf.

Kingman, Arizona, June 14.—"The mineralized area of Mohave county is comparable to a silver bow with a golden string," said a mining man from Nevada who is here on affairs connected with his calling. "For," he continued, in explanation of the parallel, "the silver-bearing section curves like an archer's bow from the Wallapai mountains to the Cerbat range, while from tip to tip, like a bow-cord, stretches the gold-bearing section of the Union Pass-Secret Pass district."

..... Within the periphery thus outlined by the visitor are some of the most valuable gold and silver mines in the southwest. A number of these mines date back in history to the days of the Arizona Argonauts and have produced millions of dollars worth of precious-metal wealth. Others are of later origin and have just entered upon their productive era. Yet others are but now demonstrating their ore-yielding possibilities. Most of them, however, old-time and prospective bonanza alike, are making good through the agency of modern mining and milling methods.

Modern Methods Bring Rejuvenation

No factors are more intimately correlated with mining success here than the formulas which have been worked out for the reduction of the refractory silver-bearing ores of the mines of the Wallapai and the Cerbat sections. The output of these mines was in past years both large and rich. It was then no uncommon occurrence for the ores to carry a silver content of several thousand ounces a ton, nor for shipments to be made to smelting points as far distant as Swansea, Wales. With increasing depth, however, the ores became more generally refractory and their values fell off. These conditions, together with the at that time long ore-haul to shipping points and the primitive ore-reduction methods employed, ultimately forced the operators to close their properties. Contributing causes were the demonetizing of silver and later the repeal of the silver purchasing act by the United States government.

With the passing of the years the railroad and the highroad came to bring the ores of the Arizona desert into quick touch with smelting points, processes were devised that are suited to their reduction needs, and the price of home-mined silver was stabilized by our government at one dollar an ounce. Thus favored by the gods of transportation, invention and chance, the silver mines of Mohave county are again going concerns and are responding satisfactorily to the test of development.

The C. O. D. mine, a veteran silver producer of the Cerbat range, has been revitalized, and now ranks next to the United Eastern and Tom Reed mines at Oatman in tonnage and value of output. The property has been equipped with mining and milling machinery at an approximate cost of \$300,000 and is shipping \$43,000 worth of concentrates to smelter a month.

The Diamond Joe mine, an old-time silver bonanza of the Wallapai mountains, is again being worked and is in line to surpass its former ore-production record.

The Golconda mine, another historic silver producer of Mohave county, is being equipped with a 100-ton mill to replace the plant destroyed by fire several years ago.

From the Dardaneles mine in the Chloride district, shipments of ore are being made that net \$45 gold-silver a ton. The ore being shipped from the Rawhide mine has a silver content of several thousand ounces a ton.

Several Districts Looking Up.

At the Kingman Silver-Gold property in the Cedar district, 20 feet of the vein is said to assay 40 ounces silver and \$5 gold a ton.

The vein in the Dean mine, another old-time property in the Wallapai mountains, carries six feet ore that assays 30 ounces silver a ton.

The old Arnold, Hubbard and General Lee mines in the Cedar district are soon to be worked by I. M. George of Kingman and associates.

In the Kingman Consolidated mine at Stockton Hill, the vein carries 13 feet of ore that assays 220 ounces silver a ton.

The Parker company is building a road to its mine in the Hibernia district.

N. E. Guyot, representing William Wrigley, Jr., is preparing to reopen the Nipissing silver-lead property in the Cerbat range.

Senator Kent Keller is preparing to resume work in the White Hills mine. Leasers on the property are shipping high grade ore.

Anson Smith of Kingman, and associates, are preparing to develop a property in the Indian Secret district, adjoining the White House mine.

Bly and Smith are assembling a milling plant at their mine in the Fall Springs district.

The tangled legal affairs of the Hackberry Consolidated Mines Company have been unraveled preparatory to the resumption of work.

The old Mossback mine in the Silver Creek district is staging a comeback under the supervision of E. A. Ritter, a well known mining engineer and geologist. A crosscut is being driven at a depth of 200 feet to pick up the faulted segment of the rich vein exposed on the 100-foot level.

At the I. X. L. mine, the Dudley interests, owner of the C. O. D. mine, are developing a promising silver vein.

A number of engineers recently examined the McCracken silver-lead mine with a view to the resumption of operations.

In the Detroit mine, located in Bobtail Basin, a vein of milling grade ore has been opened that carries an 18-inch streak assaying \$100 gold a ton.

Katherine's Future Already Assured.

Within two months from the time it first attracted the attention of mining men from outside points, the new gold district of Katherine, located in Union Pass, has demonstrated its ore-yielding future in no uncertain manner, and has gained recognition as the most promising gold-bearing section that has been discovered in more than a decade. Sixteen properties are now undergoing development there, and before the current month has waned it is not improbable that the number of operating properties will have been doubled. Investment interests in the new district, at first largely confined to Pacific slope mining men, has of late extended to Chicago and New York inquires for mining properties have been received from these points and deals for their acquisition are being negotiated.

The physical condition of the Katherine mine improves steadily as the drifts, crosscuts and raises are extended in the massive orebody opened on the 100, 200, 300 and 400-foot levels. The mine is in pay milling ore from top to bottom and has fully \$4,000,000 worth of ore blocked out. Until recently, development work on the 400-foot level was considerably hampered by a water-flow which the electrically driven pump was unable to handle successfully. This handicap has been surmounted, however, by the installing of an engine to generate electric power, thereby relieving the strain carried by the hoisting and compressor engine when forced to drive the dynamo. Relieved of this overburden, the hoisting engine is functioning to better advantage, and mine work has been correspondingly speeded up.

At the adjoining Katherine Extension, (Miller property), the double-compartment shaft entered the continuation of the Katherine vein in the latter part of May. The shaft is now in the vein to a depth of 60 feet, with a gradual increase in gold values as it is deepened. Sinking will con-

tinne to a depth from surface of 200 feet, which will carry the shaft through the vein, on its dip. Cross cutting and drifting will be the development program on the 200-foot level.

Superintendent Ed Chaffee of the Sunbeam, the W. J. Loring property, has returned from a consultation with Mr. Loring in San Francisco, and will at once proceed to develop the property on an extensive scale. Development work is in full swing at the Gold Chain, a San Francisco owned property, at the Adams, a Los Angeles owned estate, and throughout the Katherine district in general.

FOLEY'S CAMP IS LATEST ADDITION TO SILVERHORN.

By James F. O'Brien.

Silverhorn, via Pioche, Nev., June 12.—Foley's camp is the preliminary name that has been bestowed upon the little settlement that has sprung up at the site of the latest mineral discovery in the vicinity of the new camp of Silverhorn. The original find was made by Dan Foley, who has prospected from the frozen wastes of northern Canada, through the mining states of western America and on into Mexico. Other than the fact that of late he has broken into poetry—being the author of "The Dying Prospector"—Foley is a prospector of the old school who has made many finds, but he believes that his new discovery, on the west side of the Bristol range, a mile south of Bristol pass and seven miles southeast of Silverhorn, will prove better than any.

Foley says that there is a big ledge traversing that section, with five fissures coming into it, from the outcrops of all of which ore can be broken. He is opening up a vein in the center of a big quartzite dyke and though the development is limited, he has four feet of good looking ore showing with only one wall in sight. Before he started to dig on it, he took a sample of the loose surface material and the assay returns showed values of \$67.85 in silver, lead and gold.

Ervin Riggs has located the Silver Jack group on the extension of the same dyke that Foley has. He has opened up the vein for a width of six feet without finding the other wall and has decided to run a short tunnel to give him greater depth on the vein. Other prospectors also have promising showings and residents of Silverhorn are keeping cases on developments, since it is tributary to this camp.

It is probable the Silver Horn and Silver Dale received a more thorough surface prospecting than any recent discoveries during a like period. Much of this has been done by geologists of more than ordinary standing in their profession, and they have been assisted by practical miners who are themselves experts on finding ore. The latest find on the Silver Horn was made by J. Nelson Nevius and his assistant, William Henderson, who already had a number of discoveries of high-grade to their credit. Nevius and Henderson left the big outcrops for a time and went down the hill about 550 feet west of Mineral Monument where the surface looks barren and uninviting. They soon picked up some good looking float, one piece being exceptionally fine and high-grade, showing three different colored chlorides, argentite, the sulphide, and native silver. Being convinced that it could not have traveled far, they began tracing it to its source. Mr. Nevius will not definitely commit himself, but he believes he has located the ore in place from which the rich float came.

The No. 2 lease of Geo. Z. Smith on the Silver Horn is still in high-grade and assays ran as high as \$800 during the week, though Mr. Smith estimates the average of the ore as sacked to be \$200 per ton, judging from assays of grab samples. The No. 1 adit tunnel has advanced 75 feet and the

whole face is in quartz, but no assays have been made as yet. It is following the foot wall of the vein, through which crosscuts will be run at intervals. The No. 3 east adit is making the usual progress and a recent sample of the quartz returned values of \$50 per ton in silver.

Much of the work on the Silver Dale of late has been in the nature of development through the country rock which could not be expected to furnish exciting news before reaching the mineralized quartz. As this is written the lower tunnel, which was driven under at depth the rich ore body first found in the Hinson lease, has just broken into the quartz. It was not expected to find good ore until the the quartz had been penetrated for a few feet, but some of the miners who should be good judges of Silverhorn ores believe that they are in ore right now, and that it will run in the neighborhood of \$200 per ton.

A piece of new work from which important results are expected was started in the Silver Dale during the week. This is down the hill, about 300 feet south of the Teut, where a trench is being run clear across the ridge for the purpose of locating the source of the rich float found in that vicinity. There has been an improvement in values in the big orebody opened up by Geo. Z. Smith in his lease on the Silver Dale, and he now has two feet of ore that will average \$50 per ton in silver. He is continuing development here in the hope and belief that he will soon break into the real high-grade.

BACKBONE OF TONOPAH STRIKE BROKEN

Tonopah, Nevada, June 13.—A canvass of the strike situation seems to prove that the backbone of the strikers has been broken. Already one company is operating at good headway and another nearly as well with a third about ready with nearly a full crew. The mine operators have been slow in starting for two reasons. First it was desirable to give all old employees an opportunity to come back and second to provide ample accommodation and protection for such as did wish to work. Now that the union has turned down all overtures from the operators the latter have started in earnest to find new miners and to provide for them.

A good example as to provisions made is seen at the Belmont property. Provision already has been made for the seventy-five men now at work and additional housing for another seventy-five is under way and these men will be brought in as soon as the quarters are ready. The housing of the men consists of houses with 16 cots each provided with wash rooms and lavatories all of which including towels, linen and blankets are new. A big cook house has been built fitted with a big 4x8 range and every sanitary equipment.

Portable houses have also been brought in and each contains four rooms with two cots in each room. A number of these have been set aside for use by the mechanics and another set for use of guards, etc. In addition to five of the 16-cot buildings already erected several more are building and a club house completed with eighteen rooms which will be used by Supt. Smith, the shift bosses and captain of the guards. An up-to-date laundry is on the ground, also a general merchandise store at which supplies for the men are sold at slight advance above cost.

At the Tonopah Extension similar accommodations have been made for seventy men and these accommodations will be enlarged to care for double that number. At the property of the Tonopah Mining Company similar measures are being adopted and as soon as housing accommodations have been completed a force of miners will be brought in. A bossing crew has already been assembled.

Teacher—Can you tell me the shape of the world?
Pupil—Pop says it's in a hell of a shape.

POSSIBILITY OF BURIED POTASH SALTS SIMILAR TO THOSE IN GERMANY AND ALSACE.

Samples of salts recently sent from western Texas to the laboratories of the United States Geological Survey Department of the Interior, at Washington, D. C., and of the Texas Bureau of Economic Geology and Technology at Austin, Texas, contain percentages of potash that suggest at least the richness of the potash deposits of Alsace and Germany. The samples were obtained from two borings about 80 miles apart, sunk by oil companies in the "Red Beds" region of Texas, where salt beds, red shales, gypsum and other materials are associated in strata of nearly the same character as those of western Europe.

The thickness of the potash-bearing beds in Texas represented by these samples is unknown, however, and the question remains to be determined whether the deposit is thick enough to furnish potash in as great amount and of as high a grade as those in Europe, or whether it is of scientific interest only and mainly important as showing that potash-rich salts were actually deposited in this region and that other borings in areas where similar beds occur may discover commercial deposits.

Field Expert Follows Well Drillers

For several years the United States Geological Survey and the Texas Bureau of Economic Geology and Technology, working in cooperation, have maintained in the field an examiner to keep in touch with companies that are drilling for water or oil in the great "Red Beds" region of western Texas, eastern New Mexico, and western Oklahoma.

So far as practicable the drilling has been followed by this cooperative representative, who has made rough field tests of drill cuttings rich in potash and has sent samples that appeared to deserve thorough chemical analysis to the chemical laboratories of the cooperating bureaus. The problem of recognizing the presence of a thin bed of potash salt, of determining its thickness, and of identifying its precise position in the stratigraphic column is rather difficult, however, on account of the adverse conditions of observation, the methods of drilling, and sometimes the indifference of the driller.

Among the samples recently examined by D. D. Christner, the present cooperative representative at Amarillo, was one from the Bryant well, in Midland county, Texas, which, as shown by a rough field test, is very rich in potash. Subsequent accurate determinations in the laboratories of the State University and of the Geological Survey in Washington showed that this sample, which was saved by the driller from cuttings taken at depths between 2,405 and 2,525 feet, contained about 9 per cent of potash (K_2O). The sample consisted of red salt, including polyhalite, white salt, crushed red shale, and mud, so that the fragments of red salt ground up in the cuttings probably represent a layer that is richer in potash even than the sample as a whole.

Sample of Potash Salt is Second at Depth.

A small piece of red salt brought up from a depth of about 1,864 feet in the Burns No. 1 well of the La Mesa Oil Co., which is about eighty miles from the Bryant well, contained about 10 per cent of potash (K_2O).

Adequate information as to even the probable thickness of the bed represented by the samples of potash salt is lacking for both these wells. The drill records of the La Mesa well indicate that the bed struck at a depth of 1,864 feet may not be more than a foot thick; yet it may be thicker. On the other hand, the potash in the Bryant well in Midland county probably fills no more than a part of an interval of twenty feet covered by a single entry in the driller's log and by a single sample of cuttings. Consequently, though a potash salt as good as that in Europe was laid down in Texas under probably similar conditions and at about the same time, in as-

sociation with rock salt and other saline deposits, the important points yet to be determined by the drill are whether the potash deposits of western Texas are thick enough to be mined at a profit, whether we have in our own country ample supplies of relatively cheap potash for use in fertilizer, and whether the deposits possibly constitute a great potash reserve that will make the United States independent of foreign importations.

Naturally both the United States Geological Survey and the Texas Bureau of Economic Geology and Technology are interested in any additional drilling that may be done in the region and will continue to cooperate with the drillers by making careful examination of cuttings and brines. Other wells drilled in the region of the "Red Beds" salt deposits in Texas may have passed through the same potash-rich bed or beds that are found in the Bryant and Le Mesa wells, or even thicker beds, without discovering them, owing to lack of contact of the drilling companies with the cooperative service maintained by the state and federal bureaus. Thicker beds that contain potash salts may yet be found in other areas of the "Red Beds" salt basin of the Southwest, so that even if the deposits at these two wells are not commercially valuable richer deposits may be found elsewhere.

TRADE NOTES

Centrifugal Pump Users Guide for May, issued by the Allis-Chalmers Co., contains a complete description of all sizes of centrifugal pumps carried in stock and the number of each size available.

George H. Hall, secretary of the Cleveland Rock Drill Co., of Cleveland, Ohio, was a Salt Lake visitor a few days ago. Mr. Hall is investigating mining conditions throughout the western mining states with the idea of introducing his company's wares in this field.

The Utah-Boston Development Co., operating a very promising property at Bingham, Utah, recently purchased a 4x6 inch Aldrich Triplex heavy pressure motor-driven pump from the Salt Lake Hardware Co. Henry M. Adkinson, the well known mining engineer is consulting engineer for this mining company.

The Manual Training department, Federal Board of Vocational Education, recently purchased a fine testing outfit for the University of Utah from the Salt Lake Hardware Co., consisting of Cincinnati planers; milling machines and Victor drills; Hendey centering machines; Webber crankshaft tools; Buffalo Armour plate shears; electric testing machines, etc. It is claimed that this testing outfit is the finest that can be purchased anywhere.

The Allis-Chalmers Manufacturing Co. has just issued from its machinery department a seventy-two page bulletin (No. 1819) on electric hoists. Many installations of hoisting equipment, both large and small, are shown, together with numerous classes of this character of mine and kindred equipment. Also many drawings, showing construction features are given, together with blank forms upon which a prospective purchaser may outline his requirements. Any one contemplating the installation of high class machinery in the lines indicated will find this bulletin a very handy document to consult.

The Olympus Mining & Milling Co., Ltd., with offices in the McCornick Bldg., this city and of which Congressman Leatherwood is president, Dr. Christ Petrus, secretary and treasurer and J. Petrus, manager, have just purchased from the F. C. Richmond Machinery Co. a complete mining plant consisting of a large steam driven Chicago Pneumatic compressor a 100 H. P. boiler, together with rock drills, air receiver, etc., and a pipe line equipment consisting of one mile of pipe with pumps and storage tanks. This company's property is in the Freiberg district, 100 miles southeast of Ely, Nevada. The plant will be shipped during the latter part of June.

Around the State

It is stated that the quartzite contact has been reached in the Tar Baby mine in the tunnel at a distance of about 2000 feet.

The Silver-Eureka Mining Company of Provo has filed articles of incorporation with the secretary of state, showing an authorized capitalization of \$10,000 in 1-cent shares. The company takes over the Silver Dollar claims in the North Tintie mining district.

Hauling of ore from the Cardiff mine's lower bins at the junction of Big Cottonwood and South Fork canyons has begun. There is about 2000 tons of it. This ore has been stored in the bins since last fall. The road leading up the South Fork to the mine has not been opened yet and will not probably be in condition for hauling until the first of July.

Official announcement is made that the controversy between the Silver King Coalition Mines Company and the American Smelting and Refining Company has been adjusted to the satisfaction of both corporations. W. Mont Perry, managing director of the Silver King Coalition Mines Company, states that shipments will be resumed and all probability of any litigation has been entirely precluded.

John Buhler, well known Tintie man, has been awarded a contract for sinking the main shaft at the Selma property, which is located in the North Tintie district near the holdings of the Tintie Paymaster and Lehi Tintie. The main shaft of the Selma now has a depth of about 400 feet and while the present contract is for 100 feet of sinking, there is a possibility of the work being continued after the completion of this contract.

The Montana-Bingham mine is now employing fifty men and shipping 100 hundred tons of ore daily. The condition of this mine was never better. Men with dependents are given preference at this mine by those in charge. An upraise from the main tunnel will soon connect with the old Fortuna mine, which will afford good ventilation. The operating force will then be still further increased.

R. P. McFadden, metallurgist for the Lynn Big Six Mining company, after conducting a series of experiments on ore from the property, situated about twenty miles north of Carlin, Nevada, has reported to the board of directors that the entire tonnage of ore developed can be successfully treated by cyanidation. However, Mr. McFadden also states in his report that concentration before cyanidation will reduce cyanide consumption to a considerable extent.

Manager Lewis Merriman of the Apex Standard Mining Company has confirmed the report, which has been in circulation for some time, to the effect that his company has secured the control of the Tintie Eastern company, says the Eureka Reporter. Mr. Merriman stated that treasury stock of the Apex Standard had been sold and the money used in the purchase of the controlling interests in the adjoining ground.

Hugh Trenholm, mine manager for the Knight people, was in the district during the last days of May and made a trip out to the property of the Tintie Drain Tunnel, where a raise has just been completed to the surface from a point near the face of the long tunnel. The object of the raise, which was driven 688 feet before it reached the surface, is to ventilate the tunnel workings and lengthen the life of the timbers. Officials of the Knight companies have announced their intention of stopping work on the tunnel until conditions are more encouraging for the mining industry. They have no intention, however, of abandoning the project, and early in the fall this work will be resumed.

Utah Apex Mining Company has filed exceptions in the United States district court to the accounting of the Utah Consolidated Mining Company for ore extracted from disputed territory awarded the Utah Apex in the apex litigation between the two companies which was decided last fall. The Utah Consolidated filed a statement showing the value of the ore extracted plus interest as being \$658,986. The Utah Apex statement of exceptions claims a value of \$1,180,937.27 for the ore extracted plus interest of \$240,530.61 making at total of \$1,421,467.88.

Construction Notes

J. H. Galloupe is preparing for installation of another oil shale retorting plant, embodying his process, near Watson, Uinta County, Utah.

Colorado Gold Mining company of Centennial, Wyo., has applied to the federal power commission for a permit to build a low diversion dam, and pipe line to a water wheel developing about 100 horsepower on the middle fork of Little Laramie river, Albany county, Wyo.

The contract for building nearly six miles of sewer in Ogden, Utah, was awarded to the Security Bridge Co., of Billings, Montana, on the 8th instant. The contract was awarded on a bid of \$350,010.58. The next lowest bid, by an Ogden concern, was \$818,415.05. Two years ago, when the same job was advertised, there was only one bid submitted. It was for \$990,000.

A concentrating mill on the property of the Armstead mine at Talache, on Pend Oreille lake, Idaho, will be erected this summer according to Major H. H. Armstead, of Spokane, manager and president. The number of employes will be increased gradually. Twenty-five men are now employed. The plant will have a capacity of 150 tons daily.

By a vote of approximately five to one Juab county, Utah, has approved the proposed \$225,000 bond issue for the building of roads. This amount will be duplicated by the federal government, as will \$100,000 already on hand, thus giving a fund of \$650,000 for road work. It is said that construction will begin at the earliest possible date on a concrete highway from Nephi to the Utah county line, a short distance of south of Santaquin. In addition to this stretch of highway Utah county expects to build a concrete road from Payson to Spanish Fork this year.

CAMP OF BROHILCO SCENE OF NEW STRIKE

By A. J. Moore.

Fallon, Nevada, June 12.—About two weeks ago George Edson Porter, president of the Brohileco Silver Corporation, instructed Supt. Keith to level off a portion of the side hill preparatory to the erection of a hoist over the shaft which had been sunk on what was supposed to be the main shaft. In doing this bench work a small streak of ore was uncovered which widened to two feet and gave high-grade values.

Later developments show this new vein to be four feet wide and assays show values of over \$200 clear across the vein. Values have been taken varying from \$40 to \$475 a ton. This vein has only been explored to depth of ten feet, and shows at that depth as wide as does the supposed main ledge at depth of ninety feet with values quite as high. This gives the Brohileco two ledges carrying values of over \$200 across four feet in each on the Silver Leaf claim.

It may be true that the willing horse gets the heaviest load. But once in a while he also gets the most oats.

In Nearby States

ARIZONA.

The Arizona Rand Gold Mine, Inc., let a contract to R. W. Shaw for 250 feet of lateral work on the 100 foot level of the Roadside mine.

A find of asbestos is reported by J. B. Kinsey on Coon Creek, about 60 miles north of Globe. Discovery was made several weeks ago, and a number of men have been employed in development work, it is reported. Associated with Kinsey in the development of the property are J. H. Stirlin and D. L. Peterson.

Charles F. Willis, editor of the Arizona Mining Journal, P. G. Salisbury, mining engineer, and A. H. Luhrs and W. D. Twitchell, mining men, have been appointed by the Phoenix Chamber of Commerce as a committee whose work it will be to aid in co-ordinating the various mining activities in the state, and assist in the development of mining in Arizona as a part of a campaign to develop the state.

The Oatman Revenue mine has reached a depth of 54 feet in its shaft at which point the vein is being entered. The first ore encountered pans good values in gold and the impression is that when the big vein is cut through a great body of pay ore will be opened. The vein is about 35 feet wide and if the present showing continues it will be one of the big things of the district.

The Tom Reed mine has been unusually low grade for the past two months and the mill has caught up with development. They are in hopes of opening up some more good milling ore south of the Aztec shaft below the 600 level inside of the next twenty days. This ore may allow them to push development and keep the mill going. If it does not, the mill may have to suspend operations for some time, or until intended development is done and possible new ore bodies are opened up.

BRITISH COLUMBIA.

Five men are at work developing property of the Lake Shore Mining Company, which consists of 12 claims north of Ainsworth. E. J. Edwards of Spokane acquired the property last winter. It is believed to have ore similar to that in the Florence-Silver mine, near by.

Although the Hedley Gold Mining Company operated in 1921 at a net loss of \$1,941, diamond drill exploration has been encouraging and the company hopes that further reduction in the cost of mining this summer will justify the expenditure of \$35,000, for development. If this is done the company hopes to resume production next year. The property owned by the company is the Nickel Plate mine, in the Similakeem district of B. C. It is a gold producer that has paid nearly \$2,500,000 in dividends.

Ample funds are said to be at hand to construct a mill on the property of the Bulloch Gold Mining Company on Poplar creek in the Lardeau district, if the present work sustains the belief of the directors that there is sufficient ore of a good milling grade to justify a plant. Ten men are now at work and the company is purchasing a compressor and additional men will be employed. On the main lead a drift has been run 350 feet, giving a depth of 300 feet. The ore is free milling gold. W. J. Graves is president and R. H. Graves, secretary-treasurer, Spokane.

IDAHO.

Work is to be resumed in the near future by the Silver Mining Company, near Mullan.

E. J. Davey, president of the West Hunter Mining Com-

pany in the Coeur d'Alenes, has let a contract under which work is to be resumed at once.

Development has been resumed by the Rex Consolidated Mining Company in the Coeur d'Alenes. The Okanogan vein, parallel to the Rex is the objective of the present work.

Seams of ore in a vein said to be of great strength are reported in the face of the west drift in the Cedar Creek property in the Coeur d'Alenes. Work was resumed a few weeks ago.

Arrangements have been made to ship ore of the Idaho Continental Mining Company of Port Hill to the Bunker Hill smelter at Kellogg. Approximately 3,000 tons of ore and concentrates are on hand.

According to reports the joint arrangement between the Bunker Hill and Sullivan and Hecla in the opening of Star ground through the Hecla workings, active surface work has commenced. As soon as preliminaries can be arranged the 8,000-foot crosscut will be started.

Leasers working on the No. 3 tunnel of the Western Union Mining Company in the Coeur d'Alenes, are retimbering an upraise and as soon as work is finished will resume shipments. Another car of high grade ore was recently shipped by the leasers working on No. 4 tunnel.

According to reports received at Spokane, Portland parties have taken an option on one-half of the capital stock, consisting of 1,000,000 shares valued at \$150,000 of the Sonora group at Burke, located near the Hecla and Hercules mines. According to terms of the agreement one-third of the purchase price is to be paid in six months and the balance within a year and a half.

Twenty-five to thirty tons of ore is now being hauled from the Sidney mine in the Pine creek district of the Coeur d'Alenes to the smelter at Kellogg. The ore contains the highest value in silver of any ore ever shipped out of Pine Creek. The silver content is about one ounce to each unit of lead and the lead content is 50 to 60 per cent.

After months of negotiations an agreement was signed at Wallace recently which will materially benefit three distinct mining operations and assist in the development of what is considered in mining circles some of the best ground in the district. The parties to the deal were the Black Bear Mining Company, the Senator Mining Company and the Coeur d'Alene Syndicate, operating in Burke canyon at Black Bear.

The New California Mining Company has acquired the Magnet group of seven claims in the Wardner district. Extensive development work will begin soon, according to reports. The Magnet group adjoins the New Caledonia on the south and east and the acquisition of these claims gives the company 20 claims in the heart of the Wardner district almost surrounded by the Bunker Hill territory. Assays show 40 per cent lead and 5 ounces silver to the ton.

Directors of the Hecla Mining Company have declared a dividend of 8 cents a share and voted to join with officials of the Bunker Hill & Sullivan Company in the purchase and development of the property of the Star Milling Company. Eight cents a share amounts to \$80,000, the first dividend the company has paid this year. It is believed the Star is one of the great undeveloped mines of the Coeur d'Alenes. It adjoins the Morning mine owned by the Federal Mining & Smelting Company.

MONTANA.

A two-stamp mill is in operation, crushing ores from the Producer mine in Dry gulch near Helena. The ore is being taken from a six-foot vein in a stope that pans well of free gold, it is stated.

Thomas Major, who, with Fred Baekus, is operating the Gold Coin mine in Gold Run basin, out from Golconda, an-

nounces that they are installing a Gibson mill on the estate and expect to have the plant running in a short time.

Steps toward raising out the new shaft of East Butte to the surface are expected to be taken shortly. This new shaft is above the 1,200 foot level and within 800 feet of the surface. It will place the known ore bodies of the East Butte within comparatively easy cross-cutting distance as compared with the present shaft.

Silver ore mining is increasing in the Butte district, with the Elm Orlu disclosing a large tonnage of silver ore carrying an average of 20 ounces of the metal to the ton from the 800-foot level upwards, according to report. Development work now is in progress on the 300-foot level with a good tonnage of silver mining rock expected to be opened here.

That the famous Drumlunnon mine in the Marysville district may produce again is reported. The St. Louis Mining & Milling Company, owners of the property, is getting the mill in shape and it is stated that mining operations will be started within a short time. The Drumlunnon mine had produced more than \$20,000,000 and is one of the famous gold mines of the west.

NEVADA.

Harry Moon, who for many years past has been foreman of the Goldfield Tribune, and O. R. Whittaker, recently arrived in Ely from a tour of inspection to some of the old mining camps in eastern Nye county. They visited Freiburg and a number of camps in the Timpahute range.

C. E. and Arthur Millicek, about a year ago made a discovery of phenomenally rich ore at McCoy's creek, on the eastern side of the Shell Creek range, about twenty-five miles almost directly east of Ely. Their assays show values ranging from \$129 to more than \$900, which, of course, came from high grade ores, of which they have considerable in sight, besides a large tonnage of good milling ores.

Considerable interest is being taken in a strike of rich gold ore made recently at Deer Lodge, a small settlement about 23 miles east of Pioche. Many Pioche mining men have visited the strike which has created much interest in local mining circles. Samples of the gold vein, which has been uncovered for a distance of 30 feet on its strike gave the following interesting results. No. 1 sample, an average of the vein over three feet, \$52.50 gold and three ounces in silver, while an average at the farthest point yet uncovered ran \$15 in gold.

George Ryan, who for past two years, has been leasing zinc ground on properties near Ruth, and who shipped more than 6000 tons of zinc ore up to the time of the recent advance in freight rates, is somewhat elated over striking copper ore occurring alongside of zinc deposits which will average 20 per cent. As the strike was made only recently its extent cannot be estimated at the present time, but it is considered of considerable importance, as it may lead to large bodies of high grade ore, and will have a tendency to stimulate leasing in that section of the camp.

WASHINGTON.

Smelter returns running 14 ounces more in silver than mine assays on a carload of ore shipped from the Pyrarygrite mine in the Oroville district has encouraged a renewal of mining activity in that district, according to latest reports. A second carload of concentrates from the mine will be shipped to the smelter at Tacoma at once. The Pyrarygrite mine, formerly known as the Ruby, is now shut down, but the company will reorganize following a stockholders meeting June 14, and operations will be resumed.

Two miles southwest of Valley, Stevens county, are some mining properties which are looking well this spring.

One of them is the General Copper, in which a strike of good copper-silver ore has recently been made. Articles of incorporation were filed in Spokane county for the Admiral Consolidated Mining Company, which has consolidated the Admiral and Denver holdings. Arthur L. Hopper of Spokane is president. Other directors are K. E. Plath, treasurer, and William B. Sprague, secretary, all of Spokane. Work has been commenced on a new tunnel on the north end of the Admiral property. The hill is very steep and a fifty foot tunnel is expected to give 150 feet of depth. The ore is copper and silver. Two carloads shipped returned six per cent copper and seven ounces in silver. Two men are working but a larger force is to be added and the company is considering the installation of a compressor later. Mr. Hopper is also secretary-treasurer of the General Copper Mining Company, which owns property a mile north of the Admiral. Recently four feet of ore was uncovered on the surface, select sample from which run six per cent copper and five ounces in silver. The company will sink a shaft 100 feet or more to explore this ground. The ore is in the same ledge as the Admiral and Edna veins. One man has been employed prospecting and two others will be added shortly to sink the shaft. Dr. Robert Bell, is president; Arthur L. Hooper, secretary-treasurer; A. C. Johnson, A. G. Rudeen, Dr. Peter Reid, Dr. J. H. Thompson and J. V. Campbell, all of Spokane, completing the directorate.

L. W. Hutton, part owner of the Hercules mine in the Coeur d'Alenes was made honorary member of the Spokane Chamber of Commerce recently. It is the custom each year to elect a man that has done the most good for the community. Mr. Hutton's devotion to the orphans has been the means of his election to such honor. Two years ago the Hutton settlement was opened in memory of his wife and it is now caring for more than a hundred children. It is not in any sense of the word an institution for it is built on the cottage plan, a few children in each home under the care of a mother.

The Chlordie Queen mine, located fourteen miles from Colville is attracting attention. Five claims are included in the holdings of the company and through these for 3,000 feet within the lines of the company's property is a strong ledge running in a generally north and south direction. This contact ledge is 25 to 30 feet wide and situated between Clugston lime and Colville quartzite. Through the ledge are streaks of rich ore from a few inches to five to six feet wide. The ore is chiefly galena and in places there are patches of ore carrying some zinc and copper. The first opening of the ground was by shaft 75 feet deep. The No. 1 tunnel was then run to connect with the bottom of this tunnel. From the tunnel a winze was sunk 135 feet. This winze forms a continuation of the shaft. All the way down this shaft are rich showings of ore. At one place a carload of ore was taken out and shipped, returning \$62 to the ton. On the dump of this tunnel there is approximately 5,000 tons of ore and this, it is estimated will run \$62 to the ton. On the dump of this tunnel there is approximately 5,000 tons of ore and this, it is estimated will run \$22 to the ton. The ore was taken out as the shaft and winze was dug. Confident of developing a large body of rich ore the company is now driving its No. 2 tunnel 180 feet, vertically below the No. 1. This tunnel is in 360 feet and is going forward six to seven feet a day. It has 175 feet to go to reach a point sixty feet below the bottom of the winze. Eight men are employed. The property is owned by David E. Zent and associates. Paul LePlant is director and superintendent and was one of the locators thirty-seven years ago. J. C. Haas is president. The directors are H. J. Doolittle, C. H. Preston and Charles H. Case all of Spokane, and Earl T. Gates of Colville.

Estimates of the production of crude placer platinum in the United States in 1920 give Alaska, 27 ounces; California, 655 ounces; Oregon, 23 ounces, and Washington, 8 ounces.

The American Refractories Company has completed the trucking of 500 tons of burned magnesite from its storage bins at the Double Eagle mine, 13 miles southwest of Valley to the railroad. The magnesite is being shipped east to the storage points of the company for use as needed. The magnesite is the last of that burned and stored at the mine by the company before mining operations in magnesite were closed down.

Personal Mention

George R. Trask, mining engineer of Wallace, Idaho, was in New York City early in the month.

C. W. Corfield, chief electrical engineer for the Utah Copper Company, has returned to Garfield from New York.

Hjalmar E. Skougor, consulting industrial engineer of New York, has just returned from a three months trip to Europe.

Charles Hayden and D. C. Jackling, of the Mesabi Iron Co., inspected the company's new plant at Babbitt, Minn., recently.

F. C. Richmond, president of the Richmond Machinery Co., returned from an eastern business and pleasure trip early in the month.

Sterling B. Talmage, E. M., who has been in Oregon on professional business for some time past, was in Salt Lake for a few days around the tenth of the month. He is now in the Washington field, with Tacoma as headquarters.

Tom Ferguson, the well known local milling expert, has been summoned to Leesburg Idaho, by Manager E. O. Kirkpatrick of the Leesburg Gold Dust Mining Co. to place the company's new gold ore-treating mill in commission.

Dr. Walter Harvey Weed, according to the Pioche Record has been making an examination of the Virginia Louise property, with a view to outlining future development.

W. R. Appleby, Dean of the Minnesota State School of Mines at Minneapolis, accompanied by W. R. Emmons, Professor of Geology at the same institution, sailed from Seattle on June 3 for China on professional work.

D. J. Callahan, well known mining operator of this western country, has just recently taken hold of the old John Royal gold mine on the east belt of the Mother Lode, in Toulumne county, California. He reports two shifts working and states that things are looking very good.

Charles W. Whitley, vice-president of the American Smelting & Refining Co., and formerly general manager of the Utah plants, has been in Salt Lake looking after company affairs since the first of the month.

Horace V. Altree, secretary of the Salt Lake Stock and Mining Exchange, accompanied by his wife and family, left on the 7th for San Francisco, California, where he expects to spend several weeks. For several weeks Mr. Altree has been absent from his desk, due to an attack of neuritis. Mr. Altree is making the trip to California in the hope that the change in altitude and climate will improve his health.

The general belief that the ancients were able to harden or temper copper to a greater extent than is now possible is a myth, in the opinion of the United States Geological Survey, Department of the Interior. It is well known to metallurgists that processes of rolling will harden copper to some extent and that it can also be hardened by the addition of other metals. Specimens of ancient so-called "tempered" or temper copper to a greater extent than is now possible is no harder than copper that is manufactured to-day or to be simply an alloy of copper and some other metal.

Petroleum Notes

Drilling at the Rillon Oil Company camp in the Ferris field, Wyoming, is progressing very nicely, the hole being down better than 2700 feet a few days ago.

Since the day of spudding in of the Fish Lake Merger Oil Co.'s drill recently a much greater interest in oil matters has been shown by people of Tonopah and Goldfield. The 800 hundred or more persons who witnessed the spudding in at Fish Lake have each and everyone turned boosters for "Oil in Nevada."

Apparently the best well ever completed in the Rock River field was drilled in by the Ohio Oil Co. May 28, when it came in flowing at the rate of 2900 barrels a day from a depth of 2894 feet. It is known as No. 6 Diamond Cattle Co. and is in section 35-20-78. Rock River is one of the most consistent fields in Wyoming.

The test of the Centennial Petroleum Co. which has been standing at 2100 feet since last fall on the SW $\frac{1}{4}$ of NW $\frac{1}{4}$ section 17-21-61, near Torrington, Wyoming, will be continued to the second sand which is expected at from 2800 to 3000 feet. Showings were encountered at around 1500 feet and a commercial flow is expected when the deeper sands are found. The Kasomining Oil Co. is jointly interested in the outcome of this test with the Centennial.

Roxana Petroleum Corporation, a big subsidiary of the Royal Dutch Shell interests operating in the Mid-Continent field with subsidiaries of its own, has decided on an important step in placing itself in a position of vantage. It has announced that it will begin at once the construction of a 400-mile, eight-inch pipe line from Cushing, Okla., to the Stephens county, Texas, oil fields capable of carrying 15,000 barrels a day. The line will connect with South Bend and other smaller points.

ASSESSMENTS PENDING.

Silver King Consolidated, 10c. a share. Delinquent July 19. Sale day August 11.
Zuma Mining Company, 1c. a share. Delinquent July 11. Sale day August 2.
Tar Baby Mining Company, 1c. a share. Delinquent July 6. Sale day August 1.
Central Standard Mining Co., $\frac{1}{2}$ c. a share. Delinquent June 30. Saturday, July 16.
Bullion Mining, $\frac{1}{2}$ c. a share. Delinquent June 23. Sale day July 10.
Eureka Bullion, $\frac{1}{2}$ c. a share. Delinquent July 2. Sale day July 21.
Garrison Monster Mining Company, $\frac{1}{2}$ c. a share. Delinquent July 6. Sale day August 15th.
Log Cabin Mining Company, $\frac{1}{4}$ c. a share. Delinquent June 18. Sale day July 16th.
Eureka Lily Mining Company, 1c. a share. Delinquent June 14. Sale day July 14.
Southern Pacific Mining Company, 2c. a share. Delinquent June 30. Sale day July 14th.

PRICE REDUCTIONS OF HERCULES EXPLOSIVES

Effective June 1, prices on Hercules high explosives and Hercules black blasting powder, in carloads and less than carloads, were reduced as follows:

Hercules 40 per cent Extra Dynamite.....	\$1.25 per 100 lbs.
Hercules 40 per cent Gelatin.....	1.75 per 100 lbs.
Hercules 40 per cent Nitroglycerin Dynamite..	1.25 per 100 lbs.
Hercules H Permissible Explosives.....	.50 per 100 lbs.
Hercules R. R. P.....	1.25 per 100 lbs.
Hercules Expdite Permissibles Nos. 1 and 2..	1.50 per 100 lbs.
Hercules Expdite Permissibles Nos. 3 and 6..	.75 per 100 lbs.

Hercules Black Blasting Powder (Kegs)..... .10 per 25 lbs.
Hercules blasting caps and electric blasting caps were reduced in price, effective June 1, as follows:—
No. 6 Blasting Caps.....\$2.50 per thousand
No. 6 Electric Blasting Caps (4 ft. wires)..... 1.00 a hundred
Proportionate reduction on longer lengths and other electric blasting accessories.

(Advertisement)

HERCULES POWDER CO. ABSORBS THE AETNA

New York, June 7: Rumors of the proposed purchase of the Aetna Explosives Company, Inc., by the Hercules Company received definite confirmation yesterday when the Aetna stockholders sanctioned the sale of its properties, assets, and business. This marks the culmination of a transaction that has interested financial and business circles for the past two years, and which in addition to being a deal of considerable moment also presents an unusual legal aspect.

By this purchase the Hercules company will acquire high explosives, or dynamite, plants near Birmingham, Ala., Emporium, Pa., Sinnamahoning, Pa., Ishpeming, Mich., and Fayetteville, Ill., two black blasting powder plants, one at Goes Station, Ohio, and the other near Birmingham, Ala., a plant for the manufacture of blasting caps and electric blasting caps at Port Ewen, N. Y., and a plant for the manufacture of fulminate of mercury, for use in blasting caps, at Prescott, Ontario, Canada.

The explosives industry differs from most others in that it is limited geographically in making sales because of freight rates. It is only possible to ship such commodities a limited distance from the place of manufacture before a point is reached at which transportation costs make it impossible to compete with other companies having plants nearer the particular consuming center. The principal significance of this transaction of the Hercules company is that it will in the future, because of the location of the Aetna plants, be able to enter territories in which it has previously found it unprofitable to sell. It will thereby compete all the more successfully with other explosives manufacturers.

"With the Aetna Company's business, the Hercules Powder Company becomes a much larger factor in the explosives business of the United States" said J. T. Skelly, vice-president of the Hercules Company. "The company is now in a position to compete for business in all parts of the United States, and will be greatly strengthened in important fields which have hitherto been closed to us on account of freight rates from our plants.

NEW BOOKS RECEIVED.

"Oil Land Development and Valuation," by R. P. McLaughlin, petroleum engineer and geologist; formerly state oil and gas supervisor of California; McGraw-Hill Book Co., Inc. 370 Seventh Ave., New York. 200 pages, pocket size, flexible, 59 illustrations. Price, \$3. For sale by the Mining Review.

This book gives an outline of the steps necessary for the full and proper development of lands which have been determined to be oil-bearing, describes precautions that must be observed in the construction and maintenance of the wells tapping the original source of supply. The information is based upon the author's long experience in making geological and engineering investigations in the field. There are chapters on Development Program, Drilling of Wells, Assembling Information Relative to Underground Conditions, Production of Oil, Repairing, Deepening and Abandoning Wells, and the Value of Oil Land.

"Field Mapping for the Oil Geologist," by C. A. Warner, field geologist for the Empire Gas & Fuel Co., Bartlesville, Oklahoma; John Wiley & Sons, Inc., 432 Fourth Avenue, New York. Book contains 143 pages, 4 1/4 x 7 inches; contains 38 figures; flexible binding; fits pocket. For sale by the Mining Review, \$2.50.

A book of practical field value to those geologists who have had little experience with the methods commonly used in examining a territory not yet drilled. This book is just off the press and every geologist connected with the oil industry will find it an invaluable work for constant use. The book is profusely illustrated with half-tones, maps and drawings, charts, etc., and numerous tables. There is a chapter on the study of field conditions, another on maps and their value and interpretation, field mapping and methods, field instruments and their use and adjustment, and a world of other information arranged so as to make it readily available at the moment it is wanted.

"Elements of Engineering Geology," by H. Ries, Ph. D., professor of geology, Cornell University, and Thomas L. Watson, Ph. D., professor of geology, University of Virginia: John Wiley & Sons, New York. Book is 5 1/4 x 8 1/2, contains 365 pages, 252 figures, and is durably bound in cloth. For sale by the Mining Review, \$3.75.

As a whole this new book is more than a condensation and simplification of the authors' larger book, "Engineering Geology"—in fact, it has involved a complete rewriting of many parts of that book and the amplification of others. Every engineer, no matter what his special line of work, is practically certain to encounter problems of a geologic character as applied to tunneling, quarrying, river and harbor improvement, water supply, mining, etc. In this work the authors have boiled down and emphasized the practical application of the subjects treated to engineering work. There are twelve chapters and an appendix. Aside from its applicability and value in practical engineering practice, it is an ideal text book for a one-term course in engineering geology.

(Advertisements)

WANTED TO BUY—SMALL COAL MINE

I want to get a price on a small coal property (patented land) within 25 miles of Grand Junction, Colo., with full description of the property, exact location, size of veins, quality of coal, acreage, accessibility, etc. Address W. A. M. care Salt Lake Mining Review. (Advertisement.)

DIPS, SPURS AND ANGLES

Children are naturally selfish and some folks never grow up.

Most men will stand by you to the last dollar—if it happens to be your dollar.—Luke McLuke.

L. E. Monohan, a well known mining expert, is preparing to open up his mine on Wolf Creek, near Greenville, Plumas County, California. Monohan has spent the past four years at Winthrop as superintendent of the Bully Boy copper mine.

Radium is found in nearly all rocks, and especially in certain of the minerals that form these rocks but according to the United States Geological Survey, it can be obtained in commercial quantities only from the minerals uranite and carnotite.

Placing of an order for 10,000,000 pounds of copper wire by the Pacific Gas and Electric company of San Francisco was announced a few days ago. It was said to be the largest single order for copper wire ever made. The wire will be shipped from Black Eagle, Mont., it was said, and will require 270 railroad cars for transit of the consignment.

Wheeler Peak is the highest point in Nevada. According to a map published by the United States Geological Survey, Department of the Interior. The mountain stands 13,058 feet above sea level. The average elevation of the State of Nevada is 5,500 feet. Only four states—Utah, Colorado, Wyoming, and New Mexico—have a higher average altitude.

That the mining industry of the Northwest is apparently at the bottom of the depression, is the conclusion reached by the Northwest Mining Truth. Records for ten years show that dividends from the Northwest metal mines during the first quarter of this year reached a record low level. The total was only \$615,250, all derived from four Coeur d'Alene concerns with both British Columbia and Washington showing a complete blank for the first time in more than a decade.

He had a loud and healthy sleeping voice—and he snored, and snored, and then snored some more. The miners in the Silverhorn bunk house are a patient lot and, while they vainly tried to sleep, they made no move to slay the offender. At last he rolled over on his side and the snoring ceased. Then came a voice from the far end of the room: "Thank God he's dead."

United States Smelting, Refining and Mining Company

Buyers of

Ores and Concentrates

Matte and Furnace Products

Terms quoted for smelting ores, also for concentrating ores containing low percentages of both lead and zinc, on application to the United States Smelting, Refining and Mining Company, Newhouse Bldg., Salt Lake City. Smelter and lead and zinc concentrating and separating mills at Midvale, Utah; Copper smelter at Kennet, California; Zinc smelter at Checotah, Oklahoma; Lead and zinc concentrator at Needles, California; Lead refinery at Grasselli, Indiana.

Insecticides, Fungicides, Weed Killer, Poison Bait, For Sale by Our Agricultural Department. Newhouse Building, Salt Lake City, Utah.

FAULTY MATERIALS USED IN OXYGEN-BREATHING APPARATUS

That the materials now in use on standard oxygen-breathing apparatus do not afford complete protection to the wearer in high concentrations of gasoline and other organic vapors is the conclusion arrived at by investigators of the United States Bureau of Mines in a report entitled Technical Paper 272, "Permeation of oxygen breathing apparatus by gases and vapors," just issued. The authors, A. C. Fieldner, S. H. Katz, and S. P. Kinney, declare that whenever oxygen breathing apparatus is worn in organic vapors a life-line should be attached to the wearer, so that on signs of distress, he may be immediately withdrawn from the dangerous atmosphere. The materials now in use on standard breathing apparatus are, however, quite permeable to the gasses ordinarily encountered in mine-rescue work.

Question as to the permeability by gases and vapors of rubberized fabrics used in the breathing bags of self-contained oxygen breathing apparatus was raised recently by the death of James S. Cunningham, a foreman miner of the Bureau of Mines, who was overcome while wearing an oxygen breathing apparatus of the half-hour type in a large tank containing about six inches of gasoline at Trinidad, Colo. Investigation of the cause of his death indicated that the rubberized fabric of the bag had perhaps been penetrated by the vapor of gasoline. Experiments were therefore made with similar breathing bags in gasoline-saturated air. These experiments showed that when the gasoline used was highly volatile, like "casing head" gasoline, dangerous amounts of it penetrated the bag.

Further measurements of permeability were made of separate pieces of fabrics in a special apparatus. Tests lasted two hours, which is the time the larger oxygen breathing apparatus are designed to be worn. All the fabrics now used by the Bureau of Mines for breathing bags, excepting in one type, proved permeable to gasoline and benzene vapors, and undoubtedly to other organic vapors. No permeation of the fabric investigated was found for carbon monoxide or natural gas. The impermeable (in two hours) material consisted of heavy sheet rubber, one-sixteenth inch thick, made of high quality stock; no cloth was used in it.

Fabrics made of two rubberized sheets cemented with a glue and glycerine mixture were found completely impermeable; one such fabric had a total thickness one-third that required for rubber. Special tests for resistance to rough mechanical treatment, exposure to weather, hot dry air, and freezing temperature were passed by this fabric without permeation or loss of flexibility. A fabric made of cloth impregnated and coated

on one side with pyroxylin varnish allowed only a slight penetration of gasoline and benzene vapors toward the close of the two-hour test period; not enough to be dangerous. A slightly thicker coating would entirely prevent penetration. This fabric has apparently very desirable properties for use in breathing bags, and deteriorates less than rubber with age.

Final recommendations regarding the use of heavy rubber, glue-glycerine, or pyroxylin fabrics in the breathing bags of different apparatus will depend upon the results obtained in actual use of these fabrics during the coming year in oxygen breathing apparatus used by the Bureau of Mines.

Copies of Technical Paper 272 may be obtained by addressing the director of the Bureau of Mines, Washington, D. C.

FIRST AID AND SAFETY FIRST WORK.

Plans for the bringing together of the thousands of miners trained in first aid and mine-rescue work by the Bureau of Mines into local safety chapters which would form component units of a national parent organization, the Joseph A. Holmes Safety Association, were developed at a meeting of the association recently held in Washington, D. C. At the same time this legion of expert savers of life and limb, the only organization of its kind in the world, will serve as a living, stirring, deed-doing memorial to Dr. Joseph A. Holmes, first director of the Bureau of Mines, and popularizer of that pulse-quickenning slogan, "Safety First."

Present at the meeting were representatives of the American Institute of Mining and Metallurgical Engineers, the American Mining Congress, the United Mine Workers of America, the American Federation of Labor, the American Society of Mechanical Engineers, the Mine Inspectors' Institute, the American Chemical Society, the National Academy of Sciences, the American Ceramic Society, the Society for the Promotion of Engineering Education, and the United States Bureau of Mines. The president of the Joseph A. Holmes Safety Association was directed to appoint a chairman, and the presidents of the National Safety Council, the American Mining Congress, the National Coal Association, and the United Mine Workers of America, and the Director of the Bureau of Mines were requested to appoint members of a committee of six to prepare detailed plans for the organization and conduct of the work of the safety chapters of the Association, supervise the organization and conduct of the work of the safety chapters, and safeguard against duplication of the mine-safety work of any organizations at present working in that field.

It is the hope of the promoters that the various local safety chapters in the mining

communities of the country will constitute the means of bringing together the miner and the mine officials as common workers in the great cause of making safer the operation of the 35,000 mines, quarries and smelters in which a million men do their daily toil. It is proposed that the local chapters shall encourage their members to take first-aid training, expound at all times and in all places the gospel of Safety First, and hold meetings at regular intervals to discuss methods of increasing safety, good sanitation, and maintenance of health. The local chapters will also serve as recreational centers, and are expected to provide the place and occasion for numerous interesting events of a social and welfare nature. The constitution to be drafted for the government of local chapters will restrict their activities to safety and recreational lines. Inspectors will visit the local chapters from time to time for the purpose of reviewing the work of the chapters and stimulating enthusiasm for the safety cause.

Approximately 50,000 miners throughout the United States have been given thorough training in first-aid and mine-rescue work by the Bureau of Mines; and frequently local and unattached safety societies have been organized in mining towns following the training. With no practical means of following up the work, however, the enthusiasm of those trained would naturally slacken with the passing of time. It was felt that there was real need of a well organized national association which might keep alive the interest aroused by the training work of the bureau, and it was considered that the Joseph A. Holmes Safety Association was best fitted for the effort. In addition to the host of miners trained within the past eleven years by the Bureau of Mines, there are in the various mining communities more than eighty independent and unattached safety societies which are understood to be anxious to merge with the larger body.

The Association will be supported by the payment of dues of two general classes. Chapters of less than a hundred members will pay \$5 a year, while those having more than a hundred members will pay \$10. Individual membership dues in the association will be at the rate of a dollar per annum. A membership button of attractive pictorial design, suggesting both the occupation of mining and the influence of Dr. Joseph A. Holmes, will be provided.

The Joseph A. Holmes Safety Association was organized six years ago with the idea that, through its efforts along safety lines, it would serve to keep alive the memory of the honored disciple of mine-safety principles whose name it bears. The association will continue to bestow honor medals and diplomas upon those who have performed especially notable feats of heroism in rescue work at mine fires and explosions.

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Petroleum Genesis and Geology, Setting Forth Concurrent Conditions

By S. F. Hunt*

In a previous article under the caption of "Petroleum Pointers of Moment," only a generalization of the subject was intended, setting forth in brief, its history, uses and some of the conditions controlling petroleum's occurrence in Nature. It was postulated that oil-bearing formations were local concentrations or organic matter in shallow seas; and that they were always the result of a fixed and favorable set of conditions in operation at the time and place of their deposition; that these conditions had always remained locally operative and relatively constant through several eras of geologic time, which accounted for their deposition and occurrence from the Ordovician period down to recent time.

The purpose of this article is to consider in more detail the genetic factors involved in the origin of petroleum deposits; to point out the reasons and sources of the over-depth of about 600 feet of the oceans; the separation of the earth into its several spheres—the centrosphere, the asthenosphere and its role on ocean water, the lithosphere, the hydrosphere, the atmosphere and the biosphere, or range of organic life on the earth; the probable source of organic life and the effect of temperature, sunlight and color on its existence and concentration.

There has been but one "Coal Oil Johnny" as a sample of a Bocotian blockhead making a fortune in oil, and there may never be another; but many people have been fortunate or lucky and have acquired wealth through various oil enterprises in speculative and legitimate ways. But most of the lucky ones have been farmers or land owners who tilled their field for long years, and all unconscious of the "liquid gold" beneath their acres until some enterprising and knowing oil man revealed the truth to them by drilling. So it is a matter of intelligent citizenship as well as good business that each individual should acquire at least a working knowledge of the oil business, as far as his time and chances will permit, before embarking largely in this hazardous yet useful and thrilling occupation. And to get this information he should study the subject from a scientific as well as business viewpoint.

Earth Structure

This discussion may seem to lead wide of the subject for a time since physical, astronomical and geological data must be stated to bring out the concurrent action of these forces, as all of them have a bearing on the formation of petroleum. What should be known is how, when and where oil is formed before search for new fields is undertaken.

Our Marine charts of ocean soundings made for navigators and scientific research work show nearly ten mil-

lion square miles of the oceans, bordering the continents, to have a depth of about 600 feet only, while the true ocean basins have an average depth of nearly 14,000 feet. The causes, the sources and occasion of the 600 feet of new flood-water which has drowned the borders of all continents is important to know, since it is in these shallow limits that all petroleum formations are laid down.

The earth is not a homogeneous solid from surface to centre, as might be assumed, but is made up of a number of concentric shells or spheres, like the peel of an orange. These spheres from the centre outward are designated as the centrosphere, asthenosphere, lithosphere, hydrosphere, and atmosphere. The biosphere, or the zone of all organic life, is situated on the lithosphere or rocky crust at the base of the atmosphere, and for a distance down into the hydrosphere, or oceans. Little is known about the deep centrosphere except that it is about 7,500 miles in diameter, very rigid and dense, and heavier and stronger than solid iron. The centrosphere is surrounded by the asthenosphere, or an unstable, plastic gel, which has a thickness of about 160 miles, and from which the igneous or volcanic rocks are derived from beneath the lithosphere, or rocky crust of the earth as we know it. The rocky crust, or lithosphere, rides and rests on the asthenosphere and the water, or hydrosphere, floats on the lithosphere, with the air, or atmosphere, enveloping all.

All of the spheres, or earth shells, grow progressively heavier as they approach the centrosphere. At the base of the atmosphere, the biosphere is the thin film of plant and animal life, on the lithosphere and down into the hydrosphere for several thousand feet, which is the source of all organic materials, and from which petroleum is derived.

Source of Water

Astronomers teach us that great volumes of molten flame are constantly being ejected from the surface of the sun, hundreds of thousands of miles into space, only to fall back, and be again projected into cold space. This is a solar process of condensation and cooling, and the lighter combined materials would tend to arrange themselves in the outer spheres by gravitational separation, as on the earth. The asthenosphere then should represent the sun-stage of the earth and would be the assorted heterogeneous materials that have been cooled at their present plastic or gel condition by having been projected or thrown into space innumerable times during the formative period of the earth.

Finally, the radiation of heat has progressed to the formation of a cold lithosphere to a depth of 10 to 15 miles; and this rocky crust of the earth is slowly but surely growing thicker and smaller. It is this process of cooling that ac-

*Mining Geologist, Salt Lake City.

counts for and supplies the extra 600 feet of ocean water, through volcanic emanations from the asthenosphere.

If a chart showing the distribution of volcanoes over the globe is consulted, it will be observed they follow closely continental borders and islands of the ocean. The abrupt changes in elevation between the deep ocean basins and highland areas are lines of weakness and variation in surface load in the earth's crust. Along these lines of weakness and strain, as the dense cold ocean basins deepen, fissures are made through which plutonic and volcanic rocks are ejected from the asthenosphere in great batholiths and dikes. Of the 500 active volcanoes on the globe at present, less than a score are more than 100 miles distant from great bodies of water, and these all occupy positions near some ancient shore line, and are, in a manner, holdover effects.

Now, all igneous magmas originate in the asthenosphere and contain from 5 to 20 per cent of water; new, or "juvenile water," as it is sometimes called, that is being brought up and poured out on the surface of the earth for the first time, and hence adding to and deepening the ocean's water. This process has been going on since the beginning of the Eozoic, or "dawn of life" Era, and until the oceans have received enough new water to increase their depths 600 feet over Azoic levels. Most hot springs bring magmatic water to the surface also.

The effusion and transference of such great volumes of volcanic rocks, heat and water from the asthenosphere to the surface, has produced a shrinkage or condensation of the interior which has given rise to the warping, folding and faulting of the surface crust into irregular mountain masses and ocean basins. The main lines of weakness and rupture, past and present, coincide closely with shore lines. The elevated land masses constitute the background and drainage areas essential to life and the formation of petroleum sands, or terrigenous strata. The local regional tendency to warping, and the development of structures, is produced by the same agencies. Not only is this so, but most if not all ore deposits are genetically related to the same aqueo-igneous and mountain forming agencies in kind and place, but mainly along the complemental transverse lines of rupture.

A number of eminent physicists and geologists of half a century ago, argued that the water on the globe was of cosmical origin; that is, it had been picked up or attracted from space. This view was built on the nebular hypothesis of Laplace and is no longer popular. However, the moon, which is an antarian or dead planet 2160 miles in diameter, instead of a satellite, has lost its water either to the earth, or it has been dissipated into space. But even though the earth has picked up the water from the moon it could not amount to more than one to three per cent of the whole. The huge dead volcanic craters on the moon, bear ample evidence that it contained its full complement of water in the beginning or sun-stage, whether the earth has received it or not.

The Biosphere Zone.

Since it has been asserted that petroleum is formed by the reduction of organic material in shallow salt water along sea coasts, the matter of the origin and congregation here of the organic life essential to its occurrence will be reviewed.

A palusible theory of the origin of life by J. G. Gregory, in his "Geology of Today," is as follows: "A catalyzer is an agent which starts an operation without appearing to take any part in it. It was probably the addition of a phosphoric catalyzer to some primitive inorganically formed protein body that gave it the power of continuous self-division, and thus converted some globules of inorganic protein into living protobion (plankton.) The loss of water from the exterior layer would have given the organism an enclosing envelope and the concentration of the catalyzer into a central portion would have lead to the formation of a nucleus. Thus protobion would have passed into the first cellular organ-

ism." Sir Edward Shafer advances the same view. Charles Schuchert, professor of paleontology Yale University, in part-two "Text Book of Geology" says of life conditions: "The presence of life in the ocean is conditional upon the 'law of the minimum'—that is, it is dependent upon the presence of nitrogen compounds, phosphoric acid and silica, which are the minimal food elements, those least abundant in sea water. If any one is absent there can be no life, and the quantity also limits the amount of life that can exist. As the assimilating green marine plants use the minimal as well as the maximal foodstuffs and convert them into organic substance, their presence and quantity are conditional upon the minimal elemental material."

Plankton is an inclusive term used to describe the various microscopic plant and animal organisms that float in sea water, and which are far more abundant near the shore lands and in temperate waters than out in the open ocean, or warm or icy waters. The incalculable swarms of these minute organisms constitute a stupendous amount of organic material. In some shallow seas a single quart of water contains 5000 to 12000 individuals. They are affected by sunlight and adjust themselves to it. In the daytime they sink to a depth of about 100 feet below the surface; in the dark, they rise to the surface and produce the phosphorescent sheen to be seen at night on the ocean waves. Schuchert says: "The plankton is the food for most of the animals living on the bottom of the oceans, and all animals that swim freely about are dependent for sustenance upon it. In other words, the plankton is the ultimate source of food for all marine animals. The planktonic plants when growing take in carbonic acid and free oxygen, bringing about more favorable habitats for animals, a condition attained in greatest measure in temperate waters."

Many analyses of sea water have failed to detect the presence of phosphorous in solution; but similarly conducted analyses on fresh water streams that flow into the ocean, always show ponderable quantities of phosphorous in any of them. So the plankton organisms must depend for phosphorous and life upon the inflow of rivers of fresh water, which necessarily discharge their loads upon the continental shelves. This being the case, the concentration of 80 or more per cent of sea life above the 600-foot level is readily made plain. It explains the lateral concentration of organic life within the epicontinental seas which, cover about 5 per cent of the surface of the globe, and which amounts to a concentration of over 350 into 1.

Vertical Range of Life.

An examination of the vertical range of organic life should lead to a coordinate conclusion. Taking sea level as a datum line, about 25 per cent of the dry land is within 600 feet of sea level. Upon these lowlands every dense population and nearly all great cities are found. Most of the great forests, rank jungles and rich fields teeming with swarms of animals and vegetable life abound, and probably more than 50 per cent of the land life exists within this limited vertical horizon. As we ascend into higher attitudes how rapidly fade the evidences of most forms of life; and when altitudes of eighteen to twenty thousand feet are reached, only a few Alpine or Arctic ground plants and possibly a few insects remain. Above, all is bare and cold; the homing place of the Winds, the Throne of Aeolus. No life is there.

Returning to sea shore we will, figuratively speaking, elbow our way down through the strange forests pastures of the sea, and the grewsome swarms and colonies of sea life to a depth of 600 feet, where we arrive at the edge of the continental platform; then we plunge down into the pitch-dark abysmal depths of the ocean's floor, only to find that we have reached a lifeless region of still, cold water and red ooze. On our way down we startle a few small, strange fishes and finally worms with phosphorescent torches and

owing sides to dispel the utter darkness about them. In the depths below, with a water pressure of 10,000 to 12,000 pounds per square inch, all is icy cold and still as death; it is the realm of Night and Erebus. No light or life is there. We find the vertical range of life to be six to seven miles with its maximum congregation again near sea level.

Sunlight Source of Life.

Darkness is destructive to all forms of life. Greenhouses must have sides and roofs of glass to admit sunlight to growing bulbs and plants, which will fade and die without light. Vegetables and herbs stored in cellars and dark places will sprout and grow toward the light, but will be colorless and die if no light is admitted. Chlorophyl, the green color in plants, is produced by sunlight. Just why life is dependent on sunlight is not altogether plain, yet such is a fact.

The astronomer's spectroscope, by resolving them into their separate lines, shows that sunlight is composed of different degrees of length and penetration. Some of these light rays are life-giving and some are not. Some of them penetrate seawater to great depths and some do not. Those that possess the least power of penetrating water—the yellow orange and red rays—are the life-givers. They go down to a depth of only 500 feet. The green, ultra-violet and blue rays penetrate to much greater depths—1000 to 3000 feet—but are valueless as life-givers. This is a final reason why life is scant and ultimately disappears in the ocean depths. Only such forms of life as possess the light phosphorescent quality in their bodies, like the fire-fly, can live below depths of over 3,000 feet; yet a few strange forms do inhabit depths of light to twelve thousand feet—but they are insignificant.

It may be the work or province of the benthos, or bottom animals, inhabiting depths of 600 to 3000 feet, that of necessity must live on the waste and dead materials swept from the shallower platforms, to store up and deposit calcium phosphate. The decomposition work performed by the sulphur and petroleum bacteria on the terrigenous muds, appear to remove much of the lime and most of the phosphorous in a colloidal state from these deposits, leaving iron pyrites and petroleum as the results of their activities. Phosphate rock may thus be deposited as an end product of petroleum in deeper water farther from shores, where only green ultra-violet and blue rays penetrate.

Examples and Illustrations.

Petroleum is now being deposited and stored in sands in shallow seas when favorable conditions are present, much in the same manner and under about the same set of conditions that prevailed in Ordovician time, when they were first formed on the continent. Black petroliferous muds are now being deposited in Bristol Bay, Alaska, near the mouths of the Nushagak and Kuskokwim rivers; in the Gulf of Mexico, along the Louisiana and Texas coast; in the Gulf of California beyond the mouth of the Colorado river, and in the Atlantic, in some sheltered bays, between the mouths of the Hudson and St. Lawrence rivers, and in other places. The black Hudson river muds, ten to thirty miles out to sea, contain 10 to 20 per cent petroleum and some iron pyrites. A marine, or sailor's sound chart reveals, not a level mud plain, but an undulating, uneven, ridged and rolling floor where these deposits are now being laid down. These structures are built up with the petroleum measures as they are deposited.

The Finding of Oil Fields.

The discovery of new oilfields is an expensive, but not mere luck and chance affair, when undertaken with a proper understanding of their geologic relations. To acquire this one must be a careful observer and know the difference between lithified and metamorphosed rocks; their relative ages, thickness, distribution and character, whether of fresh or salt water formation; and prospect for them where

they were deposited near some ancient land mass or island large enough to have had a considerable drainage.

The existence of anticlines, domes, or any or all favorable structures need not be considered or searched for, because the nature of the deposits themselves, being terrigenous, have originated and supplied these migration channels and collecting ridges at the times of their deposition; or they were formed where the necessary warping or diastrophic forces were at hand to produce them.

Anticlinal ridges, quaquaversal domes, and structures of all kinds are to be found here, there, and almost everywhere, and in the main are misleading and worthless. Erosion, too intense and widespread diastrophism, folding, faulting and metamorphism are not the friends, but the enemies, of the oil man. These agencies have removed, drained and demolished more oilfields than they have benefitted.

Regardless of structures, too limey or too siliceous, evenly bedded, deep water sediments are barren of oil. It is the mixed, unevenly bedded, lenticular rubbles and sands interbedded and covered with shales, mudstones and marls that are the "land made," or terrigenous formations, which originally received, still contain and yield oil.

UTAH COPPER REDUCES DIVIDEND

The directors of the Utah Copper Company have declared a quarterly dividend of 50 cents a share, payable June 30, to stockholders of record June 15. This is a reduction of 50 per cent from the dividend of \$1 a share declared three months ago.

Charles Hayden, chairman of the finance committee of the company, has vouchsafed the following explanation:

"Beginning with 1915, the Utah Copper Company earned in six years \$31,141,000 more than it paid out in dividends. Only about \$12,000,000 of these surplus earnings was used in additions to property and plants or for prepaid expenses, so that some \$19,000,000 of the undistributed earnings for that period remained in copper, cash, government bonds and copper export company notes.

"There has been a substantial improvement in the metal market since the closing of the properties April 1, and due to the very strong financial condition in which the company finds itself the directors felt that the stockholders were entitled to some dividend out of the funds which were withheld from them during the past period of very large earnings."

JACKLING'S NEW SMELTER STARTS UP

The new zinc plant of the Shasta Zinc & Copper Co., at Winthrop, California, has commenced operation. The smelter has a capacity of 150 tons of ore per day. The net output of zinc oxide will be 30 tons per day. The copper, silver, and gold are saved, too, but they are by-products as compared to the zinc oxide. The zinc is volatilized in the roasters. The copper and silver matte comes from the reverberatory furnace. The zinc is caught in the bag-house as the smoke sifts through 1,408 woolen bags. These bags alone cost \$14,000.

It was just a year ago that D. C. Jackling and allied capitalists bought the Bully Hill mine and railroad for \$750,000. As much more has been spent since in building the smelter that has just been started. The buildings stand on the site of the Bully Hill smelter that was shut-down in 1909 because zinc in the ore made it impossible to smelt for copper, silver, and gold any longer. Not a semblance of the old works remain. R. L. Beals is general manager; J. H. Rose is superintendent of the smelter; and L. C. Monahan is superintendent of the mines. Seventy-five men will be required to keep the smelter going.

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*Illustrated.

LAW OF THE APEX IS DOOMED

After many years of effort, and following repeated attempts during the past twenty-five years, to revamp or revise the mining laws of the United States so as to make them conformable to modern mining practice, methods and necessities, it now seems probable that relief is at hand. It is very probable that the mining regions of the west will have to show an interest in the bill which has been drawn for the purpose and which will soon receive formal consideration in congress, by urging western senators and congressmen to give it unstinted support. Outlining what has been done so far, and what some of the salient features of the measure are, the Engineering and Mining Journal of the 18th editorially says:

The bill to revise the mining laws of the United States, which has been transmitted by the committee of the U. S. Bureau of Mines of which Mr. W. R. Ingalls is chairman, is a notable piece of work, and one that is beforehand assured the respectful consideration of both houses of Congress. It is the culmination of much work done

by the Mining and Metallurgical Society of America, in co-operation with the American Institute of Mining and Metallurgical Engineers, the American Mining Congress, and numerous other mining societies and organizations, which, having carried the work as far as it was able, requested the Bureau of Mines to appoint the present committee which now consists, besides the chairman, of Messrs. Walter Douglas J. Parke Channing, J. R. Finlay, John Hays Hammond, H. V. Winchell and L. D. Ricketts. A great deal of work on the bill has been performed by Messrs. James R. Jones and Paul S. Black, law examiners for the U. S. Bureau of Mines, who have successively acted as secretary for the committee.

The bill provides for the repeal of the "apex law," as applied to mining claims erected in the future; and discards the principle of actual discovery of a mineral deposit as a prerequisite to the location of a claim, while providing that discovery must be made before a claim is patented. The present requirements of assessment work for the holding or claims are modified.

A new feature is a provision whereby mine operators may purchase from the Government, at a fixed price per acre, the surface rights of ground for the storage of tailings, in order that such tailings may be preserved and worked at some future date when the present rich ores shall have been exhausted, and may not be allowed to be carried off by streams.

The new provisions cover all classes of metal deposits, but not coal or petroleum, or the mineral deposits which come under the leasing acts.

No rights to any mineral deposits acquired under the existing laws are disturbed.

We hope that this bill will secure prompt passage, and the mining industry should back it up heartily. It has no drawback. It is true that the iniquitous law of the extralateral rights has already done enormous damage, and that it cannot be repealed for existing claims; but there will be many new locations yet made which will be free of this incubus under the proposed law. And when the new law shall have been passed, it may become more common than now to have the owners of mining claims get together to boycott the apex law by vertical boundary agreements, a proceeding which we heartily recommend in all cases.

The enactment of the new provision regarding discovery, making an actual discovery of ore not necessary for the location and holding as unpatented ground of mining claims, is alone worth all the work which has been put into the bill. The old provision was one which encouraged mental dishonesty and disrespect for the law. Mineral land could only be located under the law by swearing to an actual discovery of ore, and there was no alternative in the numerous cases where land had to be located in order to explore it, but to comply with the law and perjure one's immortal soul. Out of this, of course, also arose a mess of law points and decisions. The new, common-sense provision will enable the prospector and miner to be at one and the same time law-abiding and truthful. And all that helps.

"ISN'T IT AWFUL"

Here we are, ten days late again; but never mind, reader. In another ten days The Mining Review will be on regular schedule and trying to forget the difficulties with which it has been necessary to contend for more than two months past.

And being late this time has its compensations. For one thing, it permits us to say that our reference to George Graham Rice and his scheme to catch "suckers" in his Bingham-Galena fish pond, in our last issue, has "stirred up the animals" to a degree that Rice and his followers and compatriots are now in line for hearings before the bar of justice.

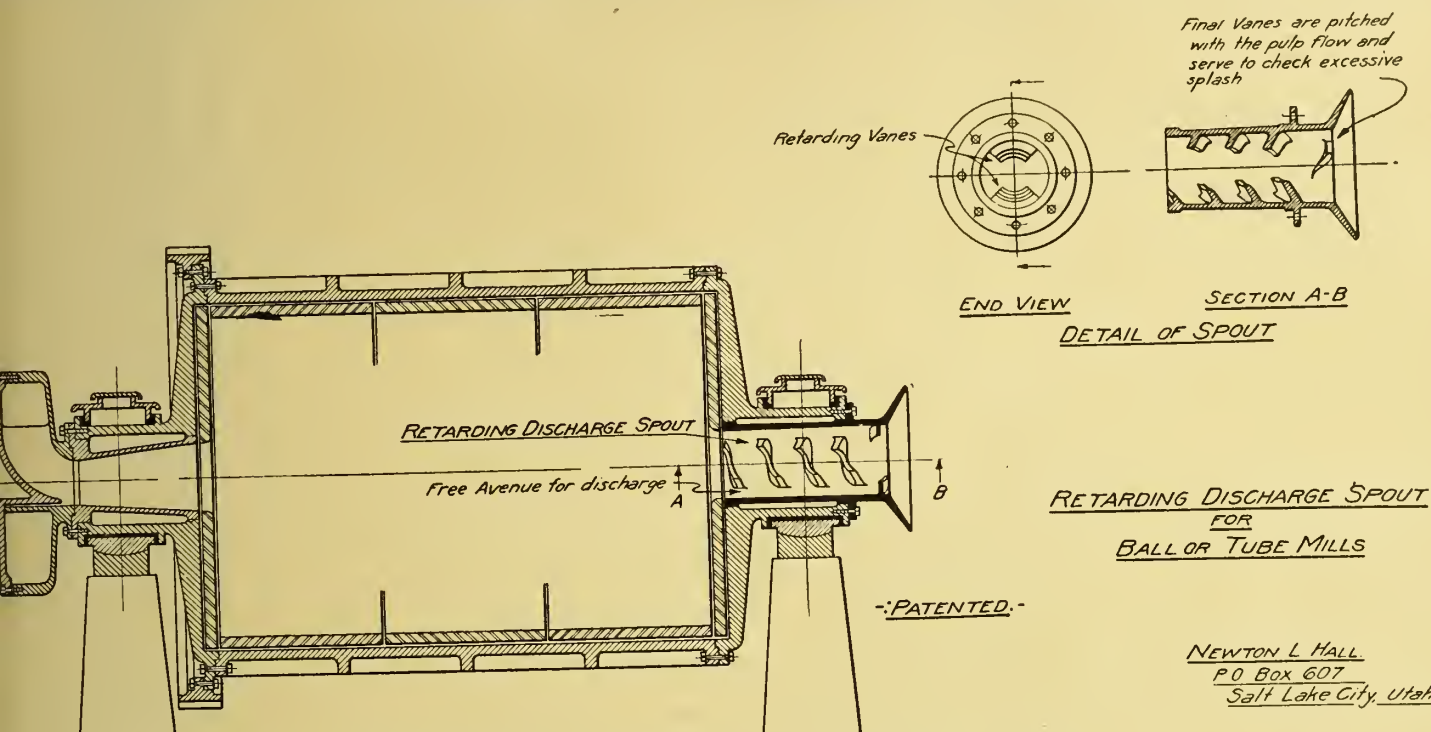
Isn't it awful? Why, it almost looks as though Rice would not have time to cash in on the 100,000 shares of Bingham-Galena that he was given as a bonus to "finance" the company. His "Broken Hills" manipulations have called down the wrath of California and Nevada victims and the courts. The San Francisco, Los Angeles and Salt Lake press—or the square-shooting portion of it, at least—are now telling who George Graham is and at the same time they are illustrating the "birds of a feather" idea to an extent that stock market patrons should have no trouble in seeing the light.

Retarding Discharge Spout for Ball or Tube Mills.

By Newton L. Hall

The Retarding Discharge Spout designed for the purpose of controlling the mill-load and for grading or classifying the discharge product of ball or tube mills, is a development originated by the writer. As illustrated in the accompanying drawings, this new and practical device is designed to fit within the liner of the discharge trunnion of

a ball mill if it extends into or faces the zone of action of the falling load. The tumbling or cascading of the load within a ball mill represents the most turbulent action of all machines used for the milling of ore and every feature of the mill which is secondary in its action to crushing should, for obvious reasons, be removed from such a zone. There are



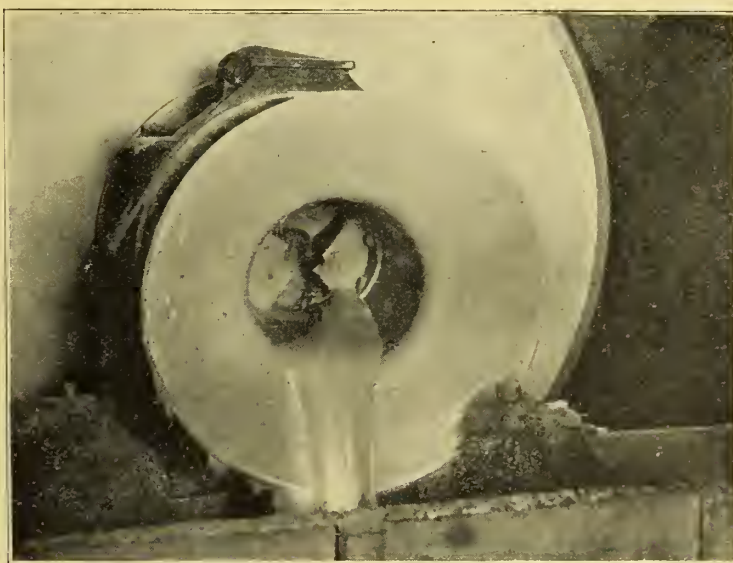
Longitudinal Section of a Ball Mill Using a Retarding Discharge Spout.

the grinding mill and functions as described in this article.

Internally within the trunnion liner two series of interrupted threads are formed and placed so as to be out of alignment with respect to each other. Open and unobstructed avenues between the vane series provide for a clear path, as shown in the accompanying sketch. The vanes forming the series are each of greater height in a direction with the discharge and all are on a pitch which is reversed to the flow. No grates or screens of any kind are required within the mill, so that the full diameter and length of the mill cylinder is devoted to load action.

In its operation, this spout does not raise the hydraulic gradient within the mill above the bottom of the discharge liner. As the loaded pulp discharges from the mill it advances through the free and unobstructed avenue between the series of vanes and is interrupted in its flow by the vanes of one series acting with the revolving trunnion of the mill, and, with the passing of this series, the discharging pulp is again liberated to a free flow through the space between the next series, and so on in succession, is intercepted on its course so as to cause an alternation of over-topping and free flow actions, the result being that a well graded product is discharged and all balls and oversize are returned to the mill. This objective is accomplished in a practical way and without unduly elevating the hydraulic grade line within the mill above the bottom of the discharge.

Any device used for grading the mill-load is objection-



Ball Mill Trunnion With the Hall Retarding Discharge Spout—500-ton Daily Mill Capacity.

cases wherein certain conditions of crushing are required which are well met by devices of peripheral and quick discharge features, but in contravention to this, there are frequent instances wherein a free and open discharge will effect a better action within the mill, both with regard to

its capacity and the crushing action required to secure a desired product.

The use of an internal reversed thread or spiral within the discharge spout raises the hydraulic grade line within the mill to the top of the highest thread and this necessarily contracts the effective internal diameter of the spout to the diametral distance of the opening between such internal threads. An increase of the hydraulic conditions of the load at the mid-section of the mill has its maximum effect upon the moisture content of the load. A similar increase at a distance from the center acts upon a chord of the circular mill section and it is likewise of less volume and effect than it would be if it were near the center or at the full diameter of the mill.

Ball mills are most effective in grinding when the moisture content of the load is low enough to maintain a dirty ball load. A clean and well washed ball load should be avoided. As the mill loading is increased it approaches a critical point where an increase of a certain percentage of moisture to the load has an increasing influence upon the crush of the discharged product, and when this critical point is attained, a decrease of a certain percentage of moisture will effect an advantageous result of greater difference in the product.

The retarding discharge spout is a simple and inexpensive device that can be advantageously applied to almost any mill of standard construction which uses steel balls as a grinding medium. The spout is located within the discharge trunnion and is away from the zone of load action, and in consequence, the wear upon the vanes is insignificant. The inner vanes, or those located close to the mill interior, controls and returns the tramp balls to the mill, due to the fact that the falling balls are in a loose and open condition as they cascade and pass the trunnion openings. This also accounts for the fact that the inner vanes control a load which is surecharged with balls.

With the vanes arranged in ascending heights in line with the discharging pulp, each vane becomes effective in grading the discharge and a superior classifying of the product is secured than is the case wherein all vanes are of the same height. When required, two vanes of light weight can be placed at the extreme discharge end of the spout to partially cover the avenues between the vane series. These vanes are made on a pitch with the pulp flow, for they serve principally to check excessive splash of the discharge when the mill is surecharged.

Between the vertical center lines of the two trunnions of a ball mill, the intervening space should be occupied by a mill of such a shape that the maximum cylindrical volume is secured for load action. Simplicity of design results in additional merit from every standpoint. The retarding discharge spout is a feature, originated and patented by the writer, which adequately controls the load within the mill and also grades and delivers a classified product in a practical and efficient manner. The space devoted for its service, that it, being entirely within the discharge trunnion, leaves the full length and circular section of the mill interior to be devoted to grinding action.

FLORENCE LEASERS STRIKE

BODY VERY HIGH GRADE ORE

By A. J. Moore

Goldfield, Nevada, June 19.—The sensation of the week has been the showing made in the Donald & Giles lease on the Florence. For months Donald & Giles have been exploring

the ground back of the stope in the old Reilly lease. It was from this ground that Joe Reilly took out a fortune during the boom days of Goldfield. This ground has been explored to some extent since the Reilly lease expired during the spring of 1907 but no one has ever gone at it quite so systematically as has Donald & Giles. They began work on the 338-foot level and opened into some of the old fills in which Reilly had dumped waste and ore then not considered worth raising to the surface. From these fills a considerable amount of shipping ore was screened and some shipments made. Meantime the work of raising in back of the old stope was under way. During the last week of April about two feet of ore was opened that added to the amount of shipping ore in sight. Assays showed from \$48.00 a ton to about \$150.00 a ton. During the following week they reached a point where the ore was found in place with two feet breaking over \$100 a ton. Values continued about the same until the last week of May when the values across the whole two feet has increased to near \$150 a ton with spots showing very much richer.

During the past week assays across the two feet show very much higher than \$200 and of this fourteen inches assays \$547. These values hold good across the 14 inches and for a distance of twelve feet. As the end of this ore shoot is not yet in sight there is good reason to believe that one of the old fashioned bonanza ore shoots has been opened.

PRINCE CON. IN NEW ORE ZONE

Since the recent announcement by General Manager M. C. Godbe of the penetration of seven feet of good ore between the 805 and 812-foot points, in the shaft of the Prince Consolidated, at Pioche, the shaft has been driven several feet more in the same formation. After the cutting of the station, now in process, lateral development will commence.

The new station at 825 or 830 feet will be for some time the most important place in the mine. It will be the base of operations in the "silver" bed and the exploration of the new high grade fissure cut by the shaft.

The company is also contemplating, Mr. Godbe says, exploratory work to the west of the shaft and beyond the Great Western fault. There, according to Mr. Godbe, the faulted segments of the various beds in the upper part of the mine should be picked up.

"We have demonstrated," he said, "that the throw of the Great Western fault is about 800 feet. The faulting sheared off the western extensions of mineral bodies, aggregating about 150 feet in thickness, and dropped them on the west side of the fault for hundreds of feet. Our recent work has enabled us to calculate with considerable accuracy the extent of the drop.

"The enrichment of these beds occurred before the faulting. It is certain that the portions cut off are as thoroughly mineralized as the parts which remained near the surface and have yielded three-quarters of a million tons of ore and a half million dollars in dividends. We have reason to believe that the mineralization will be greater. The downthrow took the faulted segments below the water level. Thus, for hundreds of thousands of years while the higher beds were being leached by percolating waters and their metallic contents were diminishing, the deeper segments, being beneath the water line, must have retained all their original values.

"If this perfectly reasonable assumption is correct, we shall, by drifting a few hundred feet west from the foot of our shaft and raising, open up massive deposits of first-class ore. Our immediate efforts, however, will be directed to the opening up of the silver bed, east of the shaft."

MINES IN SILVERHORN REGION FAVORED BY PAST HISTORY

By James F. O'Brien.

Silverhorn, via Pioche, Nev., June 25.—To those who stop to think of the tens of million dollars' worth of rich ore that has been produced in the past within a few miles of Silverhorn, it is not surprising that as prospecting continues the number of discoveries that give promise of developing into paying mines is increasing.

It is less than four miles from the massive outcrops of the Silver Horn and Silver Dale mines to the site of the old smelter at Bristol which in the seventies treated thousands of tons of ore that ran from \$100 to \$1,500 per ton. Ore running \$100 a ton was like a white chip in playing poker in those days—it entitled one to get in the game, but it bestowed no distinction. That grade of ore, in quantity, will make a lot of money for the intelligent miner in these days in spite of the big jump in the costs due to the war.

The smelter at Bristol was supplied with ore from a number of mines in the neighborhood, including those of the Bristol Silver Mines Company which are still producing and likely to continue so doing for years to come. This property, by the way, was idle for some time, when it was taken over under bond and lease less than two years ago by John R. Cook and W. F. Snyder and Sons, of Salt Lake. It has since paid for itself and the present and future production is all velvet for the fortunate owners.

That the good miners of the old days did not find all the good ore even close to the surface is proved by the finds recently made by Dan Foley and others in the southeastern part of the Silverhorn district and not over two miles from the smelter site. Foley's original find was in a vein in a big quartzite dike, and the first assay from surface material gave returns of \$67.85 per ton. Since then he has opened up the vein in several places, from all of which he got fair assays, but at a point about 200 feet north of the original discovery he took out some ore that assayed 703 ounces silver, 65 per cent lead and .06 ounce in gold to the ton. Others in the neighborhood are finding good-looking stuff, but none so far have found ore equaling Foley's high-grade. C. F. O'Brien and T. K. Wiley have three claims adjoining Foley's on the north and hope to get the same rich ore with further prospecting.

Closer to town—and not far from the Silver Peer mine which apparently appealed more strongly to Tex Rickard than the two main properties that have higher-grade ore—Perry Bramhall has resumed work on a find made by himself and Frank Middleton, of Elko, who sold the Long Hike mine at Jarbidge to the Guggenheims. The surface values here are very encouraging.

A find was made last week by G. H. Johnson and his brother on the Los Angeles claim, a mile southeast of the Silver Horn, which has got the camp guessing. Until it is determined whether it is a freak occurrence, like the finding of native copper on the Jackson claim north of camp is believed to be, or a find that opens up big additional possibilities, the miners are inclined not to get excited or give it too much publicity.

After the Johnson brothers had eaten their noonday lunch, one of them was idly poking into the loose dirt with his finger. What he supposed at first was a small rock seemed rather heavy and on picking it up and examining it he discovered that he had found a placer gold nugget worth about \$2.50. On being polished, the gold in the nugget shows quite bright and indicates that it contains silver also. It is not known that placer gold was ever found in this vicinity before and the known veins as a rule carry only a small percentage

of their values in gold. For these reasons the Johnson find has not occasioned the excitement that would ordinarily follow.

The main ore zone in the heart of the Silverhorn district has also been extended by a recent find. This was near the south boundary line of the Silver Dale No. 2 claim of the Silver Dale company, and 600 feet south of the Hudson shaft, where the first discovery of rich ore on the Silver Dale was made. The ore in the new find is in place and a sample across two feet of the vein gave assay returns of \$42 per ton in silver, while other assays showed values as high as \$93 per ton. The ground between this new find and the older workings is being trenched in order to determine if it is on the extension of the main vein, or if an entirely different vein system has been found. The importance of the find will not be lessened whichever is proven true.

The good ore showing continues with development in the north drift on the 50-foot level of the Hudson shaft and in the lower tunnel which gives 100 feet of backs on the vein. The mill ore runs \$14 or better per ton, while ore in the high-grade streaks runs into the hundreds.

The main interest at the Nevada Silver Horn is centered around the adit drifts that are being run both east and west on the footwall side of the vein. No. 1 west adit and No. 3 east adit are both showing the milling grade of ore that, while not so spectacular as the high-grade that George Smith has been sacking for some time on his leases, is considered the mainstay of the camp.

Mill ore that runs from \$11 to \$14 per ton has been found on the Nickel group of the Silver Horn Mining and Development Company, the control of which is now held by Robert Mulford, a New York engineer who is one of the principal owners of the famous Homestake mine. This is now under development.

The development on the Silver Peer is at this time confined to the east and west drifts being run on the 85-foot level. The ore in the Silver Peer runs well in lead, which is not the case with the Silver Horn and Silver Dale, the values in the two latter being practically all in silver.

BETTER BUY WINTER COAL NOW

Fiendish wisdom combined with unlimited power could not produce conditions better designed to create a shortage of coal during the winters of 1921-22 than those which now exist," says the Mining Congress Journal.

"Consumers of coal who are evidently anticipating that coal may be purchased at a lower price are entirely overlooking the fact that the wage scale agreement in the bituminous coal fields does not expire until April, 1922. Approximately 80 percent of the mine price for coal is made up of the labor cost. Little reduction can be anticipated in any line of production cost. Idle mines, idle freight cars and idle men are now begging the opportunity to mine and distribute the coal supply which the nation will need next winter.

"A consumer must learn that even with the excess production capacity of our mines that they are not able under any condition to produce a years' supply of coal in one or two months.

"Coal production cannot be made until there is an available market. Sub-normal coal production cannot continue much longer without producing a coal famine, a runaway market, profiteering prices and all of those conditions for which the consumer blames the operator, but for which he is directly and solely responsible. The coal consumer who does not immediately make arrangements to supply his needs will surely regret his improvidence."

In Nearby States

ARIZONA

J. W. Garden is unwatering the Trenton property in the Salero district, Santa Cruz county, and expects to develop some high grade shipping ore. This property has been under water for the past fifteen years and it is said that a large body of excellent grade milling ore has been developed and that some high grade ores still remain untouched in the mine.

The United Eastern has let the contract for the overhead tramway from the Big Jim mine to the Eastern mill, a distance of just one mile. The ore will be hoisted and crushed at the Big Jim and then loaded in the buckets and sent to the mill by the cable route. The contractors have agreed to have the tramway in operation ready to deliver 300 tons daily by September 1.

The development that is now being carried on on the 700 level of the Tom Reed Aztec vein is said to have disclosed the most important body opened in that property in years. So important is it that the statement is made that as soon as the big mill can be put to work on the ore now being developed that the company may be enabled to pay dividends of 6 per cent per month.

The tunnel of the Kingman Consolidated Mining Company is now within 700 feet of the old shaft on the Prince George vein and is fast nearing that objective. A crosscut of the vein revealed about 7 feet of good mill grade ore, stringers running through this mass being quite rich. It is expected that as the tunnel gets farther and farther under the hill this ore will increase in value until the main ore shoot is entered.

George Kingdon, manager of the United Verde Extension copper mine at Jerome, after a trip through Mohave county, tells his home paper that Oatman and Kingman are the most lively mining camps in the state on account of the great activity in searching for gold mines. He says all the Mohave county camps are crowded and prosperous. There is no boom excitement in evidence, but a lot of good, legitimate development going on.

COLORADO

The Silver Plume Mines Company, operating the Burleigh mill at Silver Plume, shipped four cars of concentrates in the month of May, and expects to double that output in June. They are now employing more than twenty men, and even hope to increase the force.

The Summit County Journal of Rico says: "Surprise and consternation among the mining men and business interests of the community accompanied the positive announcement by officials of the Wellington Mines Company that their mines would be closed down 'tight' on the 15th of this month."

The application of the Creede Silver Producers for a change in freight rates on ore has been acted upon, and a change of a dollar a ton was granted in the rates on low grade ores from that place to either Leadville or Pueblo. The reduction in freight rates varies from more than a dollar a ton on low grade ores to from seventy-five to ninety cents on ores of higher value.

IDAHO

The Pearson Development Company is driving a long tunnel on their property in the St Joe district of the Coeur d'Alenes. The tunnel is now in 1700 feet.

Half a dozen men under the direction of B. N. Sharp of

Spokane are driving an intermediate tunnel in the Nabob mine on Pine creek in the Coeur d'Alene district.

Dr. C. P. Stackhouse of Sandpoint, who has extensive holdings 10 miles from Clark's Fork will begin development work at once. Five men are to be employed.

Bonner county will have a complete geological survey made this summer by the state university, according to Dean Thomson. The survey will locate all the mines and mining prospects in the county.

The Bloyer Mining Company began operations of its new mill June 1 at its property in the Pierce City district of Idaho. The ore is free milling carrying values from \$13 to \$25 a ton, which it expects to mine and mill at a cost of \$5 a ton.

After expending more than \$50,000 during the last two years in preliminary work, patenting claims and driving tunnels and open cuts, the Columbus Mining Company has closed a contract with the Union Iron Works of Spokane for machinery to continue more extensive operations.

The Cyanide Gold Mining Company held its annual meeting at Bonners Ferry a short time ago. Members of the board of directors are: John Kendall and M. J. Sweeney of Spokane and J. B. Ellis, James LaFountain and George Canston of Bonners Ferry.

Another strike that may prove important is reported in the Alhambra mine on Elk creek in the Coeur d'Alenes. It is said to be three feet wide, showing high grade gray copper ore on the hanging wall side of the ledge which is about 20 feet wide.

The Sidney property continues to attract great interest in the Pine Creek district of the Coeur d'Alenes. Operations on the big surface showing made some weeks ago resulted in the storing of 60 tons of first class shipping ore in the bins. This will be moved to the smelter as soon as a tramway can be installed.

Galena ore has been struck at a considerable depth in the property of the Red Monarch Consolidated Mining Company adjoining the Callahan in the Beaver district of the Coeur d'Alene region. The body is reported to be 22 inches wide. At the point of discovery its width was little greater than that of a knife blade.

The Rex Consolidated Mining Company is proceeding with the development of its property in the Nine Mile section of the Coeur d'Alene region, according to E. P. Murray, superintendent. A drift on the Okanogan vein has been advanced 60 feet at the 400-foot depth, but this work will soon be performed by contract and a large compressor placed in commission to facilitate it. An advance of seven to 10 feet daily is expected.

At the annual meeting of the Rainbow Mining and Milling Company, held at Coeur d'Alene recently, the following board of directors were elected: George Austin, president and manager, Spokane; Henry Tufts, Coeur d'Alene, vice president; R. P. Woodworth, Spokane, secretary-treasurer; A. E. Bronson, Gibbs; I. A. Libby, Post Falls and A. H. Nourse, Cataldo, Idaho. Mr. Libby succeeded Sig Hofslund. The mines are located three miles from Wallace.

Robert N. Bell, former mine examiner of Idaho, has made examinations of copper properties along the Idaho side of the Snake river canyon, 100 miles south of Lewiston. "Idaho mines have probably paid \$150,000,000 in dividends but this is mere chicken feed in comparison with the state's mineral possibilities," Mr. Bell said. Mr. Bell asserted diamond drill development of the Snake river has disclosed primary copper sulphide ore carrying unusually rich associated precious metal value, giving quite definite evidence of

a 10,000,000-ton resource of mineral of the porphyry copper type. Assays disclose average values of nearly 3 per cent copper and fully \$4 in gold and silver to the ton.

MONTANA

According to reports from Superior, Mont., the Gilder-sleeve brothers are developing a good property two and a half miles from that town. The property contains a strong showing of niccolite. A recent assay shows 9 per cent nickel with some gold, silver and copper. The owners are driving a tunnel following a 20 foot ledge.

A rich strike of ore in a good vein has been made on the Anson property in the Scratch Gravel district, according to the Helena Record-Herald. The strike is said to be six feet in width. Sidney Norman of Spokane, head of the Scratch Gravel Company is expected in Helena this week for the purpose of outlining plans of his company for the coming year.

Character of the rock appears to be changing at the Boston & Montana Development Company property, and it would not be surprising were the Elkhorn vein to be picked up shortly by the crosscut now being driven on the 300-foot level. This crosscut now is near a point under the surface where this vein has disclosed highgrade ore and the development of a tonnage here will add materially to the possibilities of the Elkhorn.

Machinery is to be added and \$100,000 to \$200,000 expended, if necessary, for the development of the Silver Rock Mining Company's property near De Borgia, Mont. The program of development decided upon last week will take at least two years before the stockholders of the company can expect returns, but the eastern men interested are willing to put up this amount, according to a statement made by J. F. Brown. The first installment of new machinery will cost \$6,000 to \$7,000 and will be delivered within 60 days. This company now has the options on what was formerly known as the Rock Island, owned by A. L. Thurston and others. Good ore was opened in the upper workings and shipments made several years ago.—Anaconda Standard.

NEVADA

W. B. Lawler, one of the pioneers of White Pine county, arrived in Ely recently from his home in Seattle to look after his mining interests in the Schellbourne range.

State Mine Inspector Andy Stinson has returned to his duties in Carson City after an operation at a San Francisco hospital. He was in Reno one day recently, looking a little peaked but "feeling bully."

The big mill of the Tonopah Extension Mining Company has resumed operations. The mill has been closed down since April 16, two months ago. The company has a large force of miners at work and is adding to its force daily.

Alex Wise, who resigned June 1 from the management of the Con. Virginia and Ophir mines, will remain in Virginia City and direct operations at the Union, Sierra Nevada and other properties in which H. G. Humphrey has large interests.

"There's ham and eggs in the Nineteen Ten for a long time," said Lee Case as he showed the returns for a car of ore recently shipped, says the Reno Gazette. The returns gave \$73 a ton. Another car is on the dump ready for shipment and more is being taken out every day. The property is being worked under lease by Lee Case, Vernon Bell and Erling Prout.

A mill of 150 tons daily capacity is being constructed at Candelaria to treat ores from that camp. The company

operating the mill has secured a number of the old mines and some sensational high grade ores have been developed. Under the mines taken over are the famous Holmes, Mount Diablo and Argentum. The revival of Candelaria brings back to life one of the most famous camps in early Nevada history.

Frank A. Crampton, general manager of the three largest operating companies at Silverhorn, has returned from a short business trip to New York and other eastern cities, says the Pioche Record. Mr. Crampton reports that in spite of tight money conditions and worldwide unrest, there is keen and rapidly growing interest in the mines and stocks of Silverhorn, which will shortly result in great good to this camp.

The California Dredge operators and the San Francisco Section of the American Mining and Metallurgical Engineers are planning a visit to the Comstock district during the last week in June, where the operations of the various properties will be inspected, as well as the Gold Canyon dredge below Silver City. This will be an eventful occasion on the Comstock, for the visitors will include the leading mining engineers and operators of California—Virginia Chronicle.

Work was started yesterday by the V. & T. Railway laying the rails of the spur track across American Flat from the main line to the portal of the tunnel and mill site of the United Comstock Mines Co. The unloading of rails and ties began yesterday and the construction work is in charge of Section Foreman Ed Hawkins. The ballast is being hauled from Carson City. The building of the spur track is an event of no little importance, as it will mark the beginning of the extensive building program on American Flat, culminating in the great milling plant, the first unit of which is to be of 1,000 tons daily capacity—Virginia Chronicle.

A number of handsome specimens from the "Hit or Miss" mines of Hamilton were taken to Ely by Arthur Knight, the manager of the property, which gave assay returns ranging from \$40 to \$85. The "Hit or Miss" property is owned by a syndicate of ten people who have been putting up money for several years for the development of the property, upon which a number of tunnels have been run with the hope of cutting leads of ore. Recently the company has confined its energy to sinking on a vein from 10 to 12 inches in width, and from which the samples were taken. A. A. Marshall, who is a member of the syndicate, will leave in a few days for the mines and will spend the summer there assisting in further development.

Splendid results are being had by Millick and Baird Brothers in development of their mining find at Osceola. They have just completed a mill run of 80 tons of ore from which they secured a \$600 bar of bullion. This is the third mill run they have made this year. The ore was taken out in development work from a vein 18 inches wide that is all good milling ore and in which there is a streak from four to six inches wide carrying average value of \$100 a ton. The property was discovered last fall and to date has produced \$1,000. Another mill run is planned for this month. Heretofore the ore has been taken to the Willow Creek mill, ten miles from the mine, for treatment. The owners plan building a mill this season near the property.

WASHINGTON

Sacked silver ore from the Queen and Seal mine in the Deer trail district, is being stored in Springdale pending shipment to the smelter. The ore is high-grade and hand-sorted, and is being delivered by auto trucks at the rate of five tons a day.

A contract has been let to haul ore from the old Queen

and Seal mine in the Deer Trail district, 27 miles west of Springdale. One hundred and twenty-five tons of high grade ore is already sacked ready for shipment, and a crew of miners has been put to work getting out a further supply.

Operations in the magnesite mines at Valley, will probably be resumed in the near future. This is the announcement made from the offices of the American Mineral Production Company. This includes the Allan mine and the great reducing and refining plant of the Northwest Magnesite Company at Chewelah. The message gives revived hope to the magnesite interests.

Spokane and Pittsburg people have organized the Keystone Lead Mining Company to develop property consisting of 12 full claims all in one group, adjoining the Electric Point mine in Stevens county on the east. The Pittsburg people have organized a syndicate which is taking an option for \$25,000 on treasury stock, which, with their other holdings in the company, will give them control.

Around the State

At the King Coalition there is nothing new to report further than mine development is progressing smoothly and satisfactory, with usual shipments being made, and an increased pay roll. Active work on the new mill is delayed because of the non-arrival of material. The near future will see a large force of men at work on this structure—Park Record, 17th.

During the early part of last week the Eagle & Blue Bell and Victoria mines, which are operating through the one shaft and under the same management, added a night shift, putting about fifty men to work. This action followed the announcement by the American Smelting company that it would again receive ore from the Victoria and Eagle & Blue Bell.

Beginning on the 20th the Tintic Milling Company of Silver City will commence operations on the Swansea Consolidated mine in the southern end of the district, on which property the milling company has a long time lease. For the past two months a force of men have been at work at the Swansea repairing the shaft down to the 500-foot level, this work now having been completed.

The first report of a copper strike at Iron Blossom mine was made public in Provo on the 25th by Reed L. Anderberg of the Knight Investment Company. While the full extent of the find is unknown, it is said that this promises to be one of the biggest strikes made at the Iron Blossom of the Tintic district. The strike was made south of No. 1 shaft, on the 400-foot level. The approach now is difficult and efforts are being made to come to the strike from an easier direction.

The Pittsburg Radium Company, owners of a group of carnotite claims in Yellow Cat district, twenty miles north of Moab, has resumed operations on the claims after a suspension of two years. On June 14 a full crew for a double shift was taken out to the claims, accompanied by two wagon loads of equipment and a load of provisions. General Manager Stevenson, who arrived from Pittsburg is in charge of the operations. The company's equipment had been in storage at Thompsons the last two years.

While slow progress is being made in the Bingham-Tooele Mining Company's tunnel in Middle canyon, seven miles from Tooele, encouraging conditions are being encountered, according to the report of M. T. Awoki, superintendent. The formation is changing from a hard, glassy to a more calcareous quartzite with some silicious limestone showing. Some mineralization, consisting of minute sulphides has also appeared in the rock. The face is quite heavily stained with iron

oxide, according to Mr. Awoki. The Bingham-Tooele tunnel, which has been driven a distance of approximately 1920 feet, has for its objective the intersection of ore bearing fissures with the lime beds which have been so productive on the Bingham side.

Personal Mention

W. A. McKinney left for New York a few days ago on mining business.

T. Kawaseki, professor of mining at the Imperial Technical Institute at Port Arthur, South Manchuria, has been visiting mining districts in Utah.

W. S. Elliott has gone to Ely, Nevada, to look after affairs at the Northern hotel, which he owns, during the vacation of the manager, Oscar Upwall.

C. W. Newton, general manager and director of the Callahan Zinc-Lead Co., of Wallace, Idaho, has gone to New York to attend the annual meeting of the company.

Carl A. Wendell, of New York, has been appointed consulting engineer of the United States Bureau of Mines in matters relating to coal washing and coal preparation.

C. B. Lakenan, general manager of the Nevada Consolidated Copper Company, it is reported, is going to make a trip to Alaska during the inactivity of the Nevada Con. Mines.

Burt B. Brewster, intermountain representative of the Sullivan Machinery Co., returned to Salt Lake a few days ago after an extended trip through a portion of southern Idaho. He reports that a number of mining districts are taking on new life and that the outlook is growing brighter every day.

J. B. Jenson, mining engineer and oil-shale expert, left on the 24th for DeBeque, Colorado, where he was called to make an examination of oil shale deposits. While away Mr. Jenson expects to have the annual assessment work performed for the Standard Shale Products Co., for which he is field engineer.

Harry J. Gundlach, general manager of the Mine & Smelter Supply Co., operating stores at Denver, El Paso and Salt Lake, and with offices in New York, Chicago and San Francisco, was visiting the local branch of the company last week. While here Mr. Gundlach announced the appointment of R. W. Butler as manager in charge of the local house, succeeding W. R. Thurston, who has accepted a position with the McIntosh-Seymour corporation of New York. Mr. Butler is a native of Salt Lake and has been connected with the local establishment for fifteen years.

AMERICAN FLAG PLANS RESUMPTION

The last time the cage was lowered there were two or three hundred feet of water in the shaft, and the fact that it is now drained is proof the water course has been cut by development work in adjacent properties.

Last Saturday the American Flag was visited by Manager William M. Curtis and outside parties interested in the property, says the Park City Record, of recent date. The hoist was steamed up and the cage lowered to the 1,100. The gratifying surprise of inspection was to find that the shaft was entirely free of water, and in splendid shape all the way down.

It is the first time the shaft has been dry since the cave-in of the Ontario tunnel in March, 1905. Mr. Curtis is much elated over the discovery, and is confident that plans will soon be perfected to resume development work. The American Flag shaft is down 1,150 feet, which is equivalent to the 1,750 of the Silver King Coalition.

DEVELOPING RICH COPPER ORE

While many people are leaving the district and the prospects for the immediate future from a business standpoint are not bright at the present time, still it is a well known fact that the Nevada Consolidated is steadily developing a large body of high grade direct smelting ore along the contact of the Ruth mine, which was discovered some months ago in the lower workings of that property, says the Ely Record.

Before the closedown a considerable tonnage of this ore was shipped to the smelter, which averaged better than 10 per cent in copper, which is the first rich ore of importance discovered by the Nevada Consolidated since it commenced mining here more than fifteen years ago.

The discovery was made on a contact which extends through the district for several miles, and while development work at the present time is not sufficient to demonstrate the extent of the ore body, it is thought probable by mining men that ore of the same class may be found all along the contact, in which event the Ely district would soon be known as a producer of high grade copper ore, all of which is expected to average around 10 per cent. The work of developing this new body of rich ore will be steadily continued.

This is probably one of the most important discoveries ever made in the Ely district, and will materially assist in prolonging the life of the district, and is doubtless one of the causes for the recent advance in the price of Nevada Consolidated shares.

PROMINENT IDAHO MINER IS DEAD

James A. Callahan, wealthy mining man of the Coeur d'Alene district of Idaho, died at Wallace, Idaho, on the 12th. He suffered a stroke of paralysis at his home and never recovered consciousness.

Mr. Callahan was the principal stockholder in the Callahan Zinc-Lead company, which paid more than \$3,000,000 dividends in one year during the war.

Only recently Mr. Callahan suffered a \$400,000 loss through alleged bond forgeries of two Spokane business men, John Milholland and Jay E. Hough, who entered a suicide pact, Milholland killing himself. The trial of Hough was a sensation in Spokane and ended with conviction of the defendant and a penitentiary sentence.

The strain in connection with this trial is believed to have had an influence in bringing on Mr. Callahan's attack.

The career of the pioneer mining man is picturesque. Cowboy, buffalo hunter, prospector and a far-sighted business man, he was one of the principal figures in the growth and development of north Idaho.

He discovered the Interstate-Callahan group of ore deposits in 1885. For twenty years he worked this property.

In his later years he has been identified with the many business ventures in this section, in addition to his mining interests.

Mr. Callahan was born in Galena, Ill., in 1858. He is said to have located more mining claims in the Coeur d'Alene district than any other one man.

WYOMING OIL LANDS SOLD

The greatest sale of oil lands in the west occurred at Douglas, Wyoming, on the 15th, when 6,480 acres of Salt Creek oil land were disposed of by Department of the Interior at a total price of \$1,687,000.00. The sale was held under the direction of Clair Gordon, Chief of the Field Division at Cheyenne, and was attended by approximately 300 operators from various parts of the country.

Bidding in several instances became quite spirited, but on

the whole did not reach the figures that might have been expected under more favorable conditions.

The Standard Oil Company, through its subsidiaries, Carter and Ohio, picked the cream of the acreage with a few exceptions, while Midwest Refining failed to register through any known channels, although several of its representatives were present.

With 37½ per cent going to the state, Wyoming schools and road funds will profit \$632,625.00 in cash from the sale, while the amount brought in later in royalties on the same basis can not be estimated.

BETTER TIMES AHEAD

Upon his return from an extended eastern trip on the 20th Ernest Bamberger, general manager of the Ontario Silver Mining Company and Republican National committeeman from Utah, brought the most cheering news concerning general conditions, and those affecting metal mining in particular, that has come out of the east for a long time. Mr. Bamberger, in an interview with one of the daily papers, among other pertinent things, is quoted as having said:

"There has been a deflation in basic materials which will eventually reach the consumer of manufactured articles. Reduction in railroad freight rates is looked for, and this should stimulate business activity. Eastern bankers are showing an appreciation of western activities, and from an interview I had with several bankers in New York I feel certain that more liberal credits will be extended to the farmers and stockgrowers. A plan has been suggested for long-time loans to be provided through the federal reserve banks.

"In spite of depressed conditions, the consensus of opinion in the east is that the danger of a financial crisis has passed and that the corner has been successfully turned. Of course, recovery will be slow, but readjustment will surely be brought about without serious difficulties. President Harding's plan to provide credit for European countries for the purchase of American goods—but not for the building of great navies nor for making of Europe an armed camp—is meeting with strong approval.

"At a conference held in Washington, at which 90 per cent of the lead producers and smelting interests were represented, this matter was taken up and an agreement was reached regarding the tariff on ores, lead in copper mattes and other forms. Although the subcommittee on metals of the ways and means committee had closed its hearings, through the efforts of Representatives E. O. Leatherwood and Don B. Colton the matter was reopened and it is expected that an adequate tariff will be fixed on lead. The western interests are not asking for a tariff for the purpose of obtaining abnormal profits, but for one sufficient to merely give protection to the American industries and American workmen—a tariff to cover the difference in the cost of production here and abroad."

BUHL-JARBIDGE ANNUAL

The annual meeting of the stockholders of the Buhl-Jarbridge Mining Company was held in Buhl, Idaho, June 6, with better than 512,000 shares represented out of a total of 823,046 shares issued.

The election of a board of directors resulted as follows: R. W. Allred, V. R. Laird, H. C. Coleman, N. O. Thompson and B. R. Tillery. Following the stockholders meeting the board of directors elected the following officers: B. R. Tillery, president; V. R. Laird, vice-president; Jess Deemer, manager; W. H. Hudson, resident agent (Jarbridge) and J. C. Finch, secretary.

THE DAWN OF A NEW ERA ON THE OLD COMSTOCKS

By A. J. Moore

Reno, Nevada, June 25.—With the advance of progress in economic mining a new era is about to dawn for the old South End Comstocks. Mining and mining methods have changed during the past few years. Even mining engineers are breaking away from the old hard and fast rules laid down and are ever on the alert for new ideas and new economic methods. This was well exemplified during the recent visit of the San Francisco section of the American Institute of Mining and Metallurgical Engineers to Virginia City. At that meeting there was gathered together many of the world's best known and greatest mining engineers. There was a surprising mingling of great and small with no line distinctions. The great mining engineer of today no longer wraps himself about in a mantle of secrecy and profound knowledge holding himself aloof from the younger and less experienced man. On the contrary the idea that seems to prevail is "This is what I have learned. What have you discovered? Let's swap ideas." Mining is no longer a haphazard affair with the get-rich-over-night idea prevailing. It is reduced to a scientific basis, in other words, with a given equation to get the results.

The story of the early days of the Comstocks has been told so many times I will pass that over and begin with the early part of 1919 when Alex Wise began operations in the old Imperial Consolidated. He had long been imbued with the idea of a big low grade proposition, one on which with a given orebody profits could be figured to a cent. Like all such great projects he found few to give him ear, much less financial assistance. His idea seemed too big for the average man. It embraced the purchase of all the South End Comstock mines, the erection of a very up-to-date mill of great capacity, the most up-to-date of mining appliances and every labor-saving device for economic handling of ore and waste. All of this meant enormous expenditure of money for paradoxical as it may seem low cost mining is only attained today at high cost.

Plans to Interest Capital Worked Out

Mr. Wise, in his endeavor to interest capital in this great project, was handicapped by the fact that the average investor regards mining as a get-rich-quick road the approach to which is through a lane of high assays. While a few of the South End mines could at favored spots show high values the big ore bodies only showed an average of from \$5.00 to \$8.00 a ton. Furthermore there was nothing in the exposed formation to lead a mining engineer to suppose that any of the low grade orebodies led to higher values. It was simply a matter of manufacturing—at a cost of \$4.00 for labor and overhead expenses—the raw material could be manufactured into \$5.00 worth of finished product—gold and silver bullion.

The one man to whom this did appeal, from his long experience in such projects, was Herbert G. Humphrey of Reno, Nevada. He finished the capital with which to further explore the Imperial mine and a very large tonnage of low grade ore was opened up. As the mind grows upon what it feeds on the idea of enormous tonnage grew space. One after another the control of mines of the South End was secured until the project included what was once the Alpha, Imperial, Challenge and Confidence, Yellow Jacket, Crown Point, Belcher and Seg. Belcher and Kentuck, Overman and the Knickerbocker, together with some side issues that were secured only because of potential values or uses. Those who played the Comstock market years ago will re-

call that as the superintendents' weekly reports on these mines were issued the sum and substance of them were always "low grade ore." The welding together of these various bodies into one great one was accomplished by the United Comstock Mines Co. and by the aid of Buckeley Wells, backed by eastern capital.

Operating Methods Explained

The United Comstock Mines Co. is financed through the Metals Exploration Co. This company is controlled by Bulkeley Wells and about nine other very rich men and is practically a holding company. It takes over a property after it has been passed upon by its mining engineers, and it has to be some property to stand the tests. No mine is taken over on the report of any one engineer. Several reports are had by engineers working independent of each other and in many instances unknown to each other. These reports are condensed into one, an average taken as it were, and another engineer sent to report on conflicting statements. When the property is purchased a new corporation is formed and the Metals Exploration Company then advances the necessary money to finance the new project. Soon as the new company is on a paying basis the Metal Exploration Co. leaves it to work its own way. In other words it nurses the youngster along until it can stand alone and then leaves it to do its on walking and pick its own way. In this instance the Metal Exploration Co. will as needed purchase at par whatever amount of stock needed to furnish the capital to fully carry out the project and complete the plans. When the United Comstock Mines has built its railroad, completed its two mile haulage way, erected a 1,000-ton mill and installed needed machinery, then it will be left to itself to either make good or be again junked. There is no promotion stock, no stock selling campaign.

Huge Expenditures Necessary

To complete the plans of the United Comstock Mines Co. there is involved the building of several miles of railroad, the digging of a two mile haulage way and the erection of a 1,000 ton-a-day mill. It is estimated that between \$2,500,000.00 and \$3,000,000.00 will be required before the wheels of the mill turn or a ton of ore is moved. The railroad is now about ready for the rails and leads right into the millsite and all material in carload lots may be hauled right to the spot where needed thus saving unloading, hauling and re-unloading. There is no lost motion in any of the plans outlined for the United Comstock Mines Co. The building of this few miles of railroad is simple compared to that of the two mile haulage way. This tunnel, starting near the millsite, is being worked from seven faces. This is accomplished by working from the portal and both ways from the Knickerbocker shaft and the Belcher shaft, south from the Yellow Jacket shaft and north from the Imperial shaft. Connection has already been made between the Yellow Jacket shaft and the Imperial. The sections of the haulage way or tunnel is as follows, from the portal to the Knickerbocker shaft 3,025 feet, from the Knickerbocker shaft to the Belcher 325 feet, from the Belcher to the Yellow Jacket shaft 1,400 feet, from the Yellow Jacket to the Imperial shaft 125 feet, and from the Imperial shaft north to the end line of the Alpha, 600 feet. Of this work there has been completed at day of writing, from the portal to the face, 1,800 feet, about 50 feet north and south from the Knickerbocker, 500 feet north and south from the Belcher shaft, 700 feet south from the Yellow Jacket and the full 1,200 feet between the Yellow Jacket and Imperial shafts and about 100 feet north from the Imperial toward the Alpha ground. This makes a total of 4,900 feet, or a little

over one half of the total length of the tunnel when completed, viz., 9,585 feet.

Modern Equipment Used and Big Work Planned

Electric storage battery locomotives haul the dump cars used in the tunnel being advanced from the portal. These cars carry about $4\frac{1}{2}$ tons of rock and are loaded by a Hoar shoveler or mucking machine that loads a car in 8 minutes. The rock from the tunnel is used as ballast for the railroad and as filling at the millsite. Work on the mill will begin soon as the railroad is in condition to handle the mill material. Bunk houses are now under construction for a large force of men. The present work demands 175 men and the mill work will give employment to a largely increased number. The mill will be built to crush 1,000 tons daily but its construction will be such as to permit of doubling this capacity by the addition of other units as planned. It is stated that the capacity of the mill will be doubled within one year from date of starting.

Details of the plan of construction of the mill have not been given out for publication as yet, but it is understood that cyanidation will be the process adopted. This was decided upon after many months of experiments and all sorts of metallurgical tests made. It is stated that the cyanide process showed the highest percentage of extraction. The millsite is within a few hundred feet of the portal of the tunnel and at the head of what is known as American Flat. It is a few miles down the Flat that the Gold Canyon Dredging Co. is at work with their big \$350,000.00 dredger. This dredger is constructed wholly of steel and weighs 900 tons. Its length is 108 feet and is 52 feet wide and operates 2,500 buckets which can be loaded and unloaded at the rate of 20 per minute. The company has about 700 acres still to be worked over and it is said that the returns are about 17c a yard. It was the placer mining on American Flat and up Gold Canyon that led to the discovery of the Comstocks. Placer work was going on here as early as 1849 and it took ten years for the placer miners to work up the canyon to its head on what became the Con. Virginia and Ophir ground. Twenty-five men are employed at the dredger and it works 24 hours a day and in that time handles about 5,000 yards. Even at this rate there is enough proven ground to keep the dredger in operation five years or more. The Gold Canyon Dredging Co. is owned by the Metals Exploration Co.

Millions of Tons of Ore in Sight

It is stated that there are over 2,500,000 tons of ore already in sight and not including any of the old dumps which are said to contain a very large tonnage of ore millable at a profit under modern economic methods. It is said that the orebody in the Imperial alone reached over the 2,000,000-ton mark. It is said that at the time the Imperial was taken over by Bulkeley Wells this mine alone to a depth of 400 feet and for a distance 500 feet in length had enough ore in sight to operate a 1,000 ton mill for a period of seven years. On the 70-foot level the orebody is 110 feet wide on the 250-foot level from 110 to 250 feet wide, on the 300-foot level from 65 to 120 feet wide and on the 400-foot level from 80 to 165 feet wide. Since these measurements were made the Imperial shaft has been sunk to the 650-foot level and a very large body of low grade opened below the 400-foot level. None of these calculations take into account the large orebodies in the Yellow Jacket, Crown Point, Overman and Belcher. In the early days the Overman was worked to the 2200-foot level and had a bonanza orebody on the 1400-foot when work was suspended. It is also claimed that there is a big fortune in the dumps that may be extracted by the later methods of cheap milling. Taken

all-in-all the United Comstock Mines Co. may be classed as the biggest low grade proposition in the world. From the lode on which the mines that comprise the United Comstock Mines holdings are located official figures show that in the bonanza days, \$118,613,000 was extracted. It is reasonable to suppose that the mines still contain many old stope-fills and old workings of what was then considered low grade but today a mighty good mill ore. The same is true of the dumps. Hundreds of thousands of tons were thrown on the dumps as waste that can today be worked at a good profit.

At present time the offices of the United Comstock Mines Company are in the old building, a most pretentious building in its day and generation, at Gold Hill. Later they will be moved to the little town that is to be built on American Flat at the millsite. R. H. Elliott, Western Manager for the Metals Exploration Company is here most of the time and so is a staff of draughtsmen and mechanical engineers from the Metal Exploration Company. The work at the United Comstock Mines is under direction of Roy H. Hardy, and Alex Wise. It is said that of all the officials Alex Wise has the most intimate knowledge of the underground workings of the Comstocks from the Knickerbocker shaft to that of the Con. Virginia. He is the man who conceived the idea and worked it out and it was he who enlisted Herbert G. Humphrey in the project and later reached Bulkeley Wells and his associates.

Some idea may be gained of the financial strength of the people who make up the Metals Exploration Company from the fact that this company controls the Gold Canyon Dredging Company, the Cache Creek Dredging Company of Alaska, the Idaho-Maryland mine, the Fremont mine, several dredging propositions in California, mining properties in Colorado, zinc mines in the Missouri-Oklahoma district and other little things not worth mentioning unless you can think in millions.

EXPERTING IN ARIZONA DISTRICT

A party of San Francisco and Portland mining engineers, consisting of Messrs. Joseph Lawson, Hamilton Ridgeway, C. Frederic Lawson and Burt Townsend, passed through Patagonia, Arizona, about the middle of the month, enroute to the Whetstone mountains, where they will make an examination of several mining properties in this district.

The mining engineers were accompanied by Franklin B. Harding, chief consulting engineer for the Chicago Exploration & Development Corporation, and have just completed an exhaustive examination of the Los Nuevo Minas in the Altar district of Sonora for New York capitalists.

Engineer Ridgeway stated that the party expected to be busy with examinations in the Whetstones for at least six weeks, and that the work was being undertaken in behalf of a group of Portland capitalists, who were about to become interested in that district.

While the gentlemen refused to divulge the names of the properties in question, they declared that in the event that the examinations disclosed or half way came within the radius of the excellent reports so far secured and submitted by other engineers on the property, work would be started on a large scale toward developing the prospects into producers.

Bradstreet's says: "Commodity prices have fallen 40 per cent." It's too bad the people we buy from don't seem to know it.

Petroleum Notes

John R. Gourley, field manager of the Wyoming-Illinois Oil & Shale Co., which has been for some time drilling on the old Hood well at Carter, received a letter from his brother, J. M. Gourley, in which he states that the drill has penetrated a stratum of asphalt, since the cap rock was pierced, which is taken as indicating that the first oil sand is about to be encountered.

The new well recently started by the Crescent-Eagle company near Crescent, this county, is now down 300 feet, according to latest word from there, says the Moab Times of the 16th. Drilling is going steadily forward, but progress is slow on account of a cracked jar, but a new jar and stem have been ordered and should arrive soon. The new hole is 12 inches and a No. 24 Star is being used. The first sand, the Ferron, is expected at between 700 and 800 feet.

Part of the Western Empire Petroleum rig has arrived at Coalville, according to word from there. Men have already started to dig a sump at the well site, which is about a mile east of the town. It is expected to begin at once the construction of an 84-foot derrick for the standard outfit. This is considered one of the best locations possible for a well in the west limb of a great structure that extends easterly into Wyoming's productive oil fields.

Another potential oil field in the State of Nevada has been brought into prominence. A company said to be already the owner of at least forty producing wells has become interested in property at Pioneer, near Springdale, in southern Nye county, and plans putting a drill at work in the near future, according to reports that have reached Carson.

First estimates of damage by the thunderbolt fire at Utah Oil & Refining company's plant on northern outskirts of Salt Lake on the 11th placed loss at \$1,000,000; then it was reduced to \$600,000 and finally to \$350,000. There was little damage outside of tanks and contents consumed. One tank containing 1,500,000 gallons gasoline distillate was melted to the ground, and several smaller ones were consumed. Three lives were sacrificed and 45 people injured.

In California, E. C. Converse, son of a New York multi-millionaire, is a ranchman and, on occasion, a 'two-gun man.' He inherits \$30,000,000 from his father's estate and says he should have no trouble about a little thing of that sort. He doesn't know what to do with the money. Mr. Converse should authorize his business agents to buy all the oil stock that has been left over after the Texas stampede. Sellers of that kind of stock need the money too—Oil and Gas Journal.

Another possible oil field in San Juan county is being extensively located, and it is said that people close to the Midwest company have had their geologists on the ground and on receipt of a favorable report a crowd has gone in and located thousands of acres. The new field is on Montezuma creek, fifteen or twenty miles southeast of Monticello. The ground stretches over a structure 20 miles long by six miles wide. The elevation is about 5,000 feet, and the surface is covered mainly by members of the Cretaceous and Jurassic. This is underlaid by the Carboniferous which outcrops to the west, and which is believed to be the oil formation—Moab Times, 16th

LINK-BELT BUYS CALDWELL CONCERN

Charles Piez, president of the Link-Belt Company of Chicago, has just released the information that his company has acquired all of the capital stock of the H. W. Caldwell & Son Company, and that Frank C. Caldwell has been elected a director of the Link-Belt Company. Two experienced and

forces, with the result that the Link-Belt Company has added successful companies in the conveyor world have thus joined two new lines—Helicoid conveyors and power transmission machinery—to its line of manufactures.

While the H. W. Caldwell & Son Company's plant will continue to operate under separate corporate existence and under its present name, the joint facilities of the two companies, and the broader avenues of distribution of the Link-Belt Company, ought to prove of distinct advantage to the customers of both.

OIL ACTIVITY IN UINTA BASIN FIELD

Considerable interest is being manifested in the oil possibilities of the Uinta basin, according to George H. Short, Salt Lake geologist, who returned from the Hill Creek dome during the month, after making a week's reconnaissance. When Mr. Short was in Vernal there were, he says, five geological parties making a reconnaissance of structures in the basin. Between Watson and Vernal, according to Mr. Short, there are three rigs drilling, and on the Moffat dome, under the direction of Preston Cannon of Salt Lake City, there are two rigs at work.

Indications pointing to the possibility of oil being developed on the Hill Creek structure are unusually promising, according to Mr. Short. Both the formation and structure are favorable to the belief that oil will be developed he says. In Hill Creek, a canyon cut by erosion, there is an outcrop of saturated sand which is about fifty feet thick, taking into account the thin layers of shale found in the bed. Oil seeps are found in numerous places, also. Samples of the sand brought back by Mr. Short are heavily impregnated with oil residue. In places where the heat of the sun has been unusually intense, this heavy oil oozes out, he says.

The structure, along the axis of the anticline, running in a northeast-southwest direction, is at least twenty miles long and about eighteen miles wide, Mr. Short reports. The upper strata of the structure belong to the lower Green River formation, while at depth will be encountered the Wasatch. Mr. Short is quite certain pumping wells can be developed by drilling the upper strata back a mile or so from the Hill Creek escarpment and that large producers will be developed in the Wasatch formation. By drilling in the creek bottom, Mr. Short believes that these sands can be thoroughly exploited by sinking from 800 to 1,200 feet.

Those interested in the district hold that the sands, which will be exploited at depth in the Hill Creek dome, outcrop about forty miles to the west in Whisky Creek, where the Urado company has its productive oil flow, and miles to the south at Sunnyside.

The Hill Creek Oil and Refining Company is making plans whereby a Star No. 28 rig can be shipped into the field via Watson. From the center of the Hill Creek dome to Watson is a distance of forty-two miles. To Price is about eighty miles. At present a road is being built from Price to Hill Creek. When this work is finished, which will be within a month, it will be possible to go into the field by automobile.

From Salt Lake City to Vernal the roads are in excellent condition, according to Mr. Short. From Vernal to Watson, although the road leads through the sagebrush, good time can be made. From Watson to the field there is no graded road. Dry washes constitute the road. Although these washes make an excellent roadbed, because of the fine ground rock which forms their surface, good time can hardly be made, owing to the fact that many short turns must be made.

United States Smelting, Refining and Mining Company

Buyers of

Ores and Concentrates Matte and Furnace Products

Terms quoted for smelting ores, also for concentrating ores containing low percentages of both lead and zinc, on application to the United States Smelting, Refining and Mining Company, Newhouse Bldg., Salt Lake City. Smelter and lead and zinc concentrating and separating mills at Midvale, Utah; Copper smelter at Kennet, California; Zinc smelter at Checotah, Oklahoma; Lead and zinc concentrator at Needles, California; Lead refinery at Grasselli, Indiana.

*Insecticides, Fungicides, Weed Killer, Poison Bait, For Sale by Our
Agricultural Department. Newhouse Building, Salt Lake City, Utah.*

NEW OIL REFINERY AT VIRGIN

According to the Washington County News the new oil refinery at Virgin, Utah, is nearly completed. The equipment includes two steam boilers equipped for burning either crude or refuse oil and two stills, one to be heated by steam, the other a crude oil still equipped to be heated the same as the steam boilers. Each of these is resting on a stone walled foundation. Between the two boilers is a small boiler used as a tank for water the water being piped to all places where it is needed. Near the stills is a high platform on which are two tanks to be used as condensers, and nearby is the agitator. A large covered tank is near for storage of gasoline.

The four producing wells are to be pumped by one steam engine and forced into the storage tanks. A sort of vacuum system of pumping will be installed; this will tend to develop the wells by opening the oil fissures. Well No. 1 has been improved by shutting off the sulphur water. Cement was poured into the well mixed with the other coarse materials and this was allowed to partially harden and then a hole was drilled through this hardened cement and the water was cased off.

On the hill back of the refinery the large storage tanks are erected. Pipes are laid from these to the refinery and to other parts of the field where needed. One large tool house and work shop and a small tool shed besides a camp house complete the refinery proper.

As soon as the refinery is running an ice plant will be installed to take off the paraffine wax. An electric light plant is at the works ready to be installed. There were six men working at the refinery and two men setting up a drilling machine nearby.

ORE SHIPMENTS

A substantial improvement in the movement of ores from Park City, Tintic and other Utah mining districts has taken place during the two-week period ending on the 24th. Park City practically doubled its output during the last week of the period. Ore shipments out of the Cottonwoods also have commenced and reports from Pioche are to the effect that normal production from that section will be soon under way.

Park City shipments for the period stated amounted to 1755 tons, as follows:

Judge Allied Companies	961
Naildriver	180
Ontario Silver Mining	621
Silver King Coalition	930

Shipments from the Tintic district, which are always reported in carloads, instead of tons, reached 286 carloads, as follows:

Tintic Standard	95
Chief Consolidated	81
Dragon Consolidated	22
Eagle & Blue Bell	19
Iron Blossom	20
Iron King	13
Colorado Consolidated	5
Mammoth	5
Victoria	9
Swansea	7
Martha Washington	2
Eureka Mines	1
Gold Chain	4
Gemini	2
Eureka Bullion	1

METAL MARKET QUOTATIONS—JUNE 24

Silver	99 $\frac{1}{4}$ c
Silver in London	35d
Copper (electrolytic, spot)	12 $\frac{3}{4}$ @ 13c
Lead	\$4.40
Zinc	\$4.40 @ \$4.50

WORLD'S LARGEST DEPOSIT OF ROCK SALT

Vast quantities of rock salt lie less than half a mile beneath the surface of the earth in the United States. In New York, Ohio, Michigan, Pennsylvania, West Virginia, and other states there are large deposits, but the largest deposit in the United States, and probably in the world, is that which extends from northern Kansas across the west end of Oklahoma, the panhandle of Texas, and southeastern New Mexico to western Texas. The area underlain by these great Permian salt deposits is not far from 100,000 square miles, according to the U. S. Geological Survey.

The limits of the deposit, especially to the northwest and southeast, have not been ascertained, but in general the area of thick salt extends fully 650 miles from northeast to southwest, and is 50 to 150 miles wide. The thickness and the succession of the beds are variable, but 700 feet is reported in one hole, and in many places the aggregate is more than 300 feet. On the assumption of an average thickness of 200 feet of salt, the gross quantity in the area of 100,000 square miles is so large, about 30,000 billion tons, that the present needs of the United States (about 7,000,000 tons a year) can be supplied for millions of years.

COAL NOTES

The United States Fuel Company has developed the idea of assisting its miners to save money by helping them to raise gardens. In order to aid the miners as much as possible the company furnishes the men and teams to plow the land, gratis. The result is that every miner is plowing up his yard and planting it in vegetables.

According to reports received by the United States Bureau of Mines from the various state mine inspectors, 127 men were killed during March, 1921, in and about the coal mines of the United States, as compared with 181 killed in March, 1920. Thus the 1921 figures show a decrease of 54 fatalities, or about 30 per cent, from the record of the corresponding month of last year. For the same months, the output of coal fell from 54,689,000 tons to 37,342,00 tons, a decrease of 17,347,000 tons, or 32 per cent, attributable almost entirely to lack of demand.

CONSTRUCTION NOTES

The Carpenter Construction Company of Salt Lake offered to erect the new West high school building, to be built on the site of the present West high school, for \$595,500. This was the lowest of eleven bids which were opened by the board of education at a special session at noon on the 17th.

Kemmerer, Wyoming, took a long stride forward on the 11th, when, at a special meeting of the city council, a contract totaling \$10,977.93, was awarded for the construction of modern sewer improvements in the down town section, as well as a number of small projects in the residence district. The successful bidder was W. E. Pitt, local plumber and contractor, whose bid was less than \$300 lower than his nearest competitor.

Did you ever notice that the needles of the pine tribe come into the world in pairs, trios and fives? The white pine needles are born in clusters of five. The scrub pine is reduced to two; the pitch pines are in clusters of three. Each of the pines is faithful to its family tradition in this respect, a habit that aids materially in the determination of the species.

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Vipont District Mines and Prospects.

Permanence and Magnitude of Silver Deposits Indicated and Geological Characteristics Explained.

By S. F. Hunt*

The Ashbrook mining district is situated in the extreme northwest corner of Utah, in Boxelder county. The north and west boundaries of the district adjoin the Idaho and Nevada state lines, respectively, the district covering an area of four townships, or twelve miles square. The Vipont mine, the chief property at the present time, is located two miles south of the Idaho line, in Sec. 6, Tp. 14 N., R. 17 W., Salt Lake Meridian.

The camp and main workings of the Vipont mine, are situated at 7,000 feet above sea level in an open, rolling, treeless, grassy basin, sheltered from the north and facing a southwest view.

As far as mine workings have progressed they have proven typical silver deposits, making in a "mother lode" limestone stratum of Paleozoic age, 20 to 50 feet thick which unconformably overlies a west-dipping quartzite bed-rock formation. There is movement and shearing between the probably Ordovician, black carbonaceous shale hanging wall and the ore lime, and a 50-foot sill of trachite-porphry has introduced between the ore and the quartzite foot, along the plane of non-conformity, for two or more miles, following a northwest direction.

The district is not new; float and ore having been found by the Vipont brothers, so report avers, in 1864; yet the Ashbrook mining district was not organized until ten years later, in July, 1874. Not so much for lack of ore, but for milling, metallurgical and marketing adversities, a half dozen unsuccessful mining operations have failed in the last thirty years, although quite a production and a number of carload shipments of high-grade silver ore have been sent to Salt Lake smelters since 1891.

Just what the total production of the district had amounted to prior to the advent of the present operating Vipont Silver Mining Company is hard to say, but J. H. Paris and Frank J. Lake are credited with marketing over \$125,000 worth of ore and bullion prior to 1919, when the mine changed ownership. If the present rate of production is continued the total output may exceed \$1,000,000 by the end of the present year. The company is now mining and milling 150 tons of ore per day, the concentrates going via Oakley, Idaho, to the Salt Lake smelters for treatment.

Surface Features of the District

A mountainous topography of high smooth-worn ridges with broad, gentle, sloping sides descending into open, grassy basins, characterize the broader aspects of the district. About three miles south of the mines the two Vipont peaks lift their smooth, even shoulders and rounded tops to an altitude of 8,000 feet. The whole view is one of delightful mountain scenery, and rolling fields of green painted with many-colored wild flowers. A garden of beauty in summer, but a bleak, wind-swept habitat of snow and cold in winter. In the cool high draws, sheltered from the sun, are a few clumps of firs and stunted quaken aspens that supply the local demand for fuel, house-logs and mine timbers.

The drainage is northwest down Mill Creek into Goose Creek, which flows north into the Snake river. There are two wagon roads, each twenty-eight miles long, leading northward to Oakley, Idaho, the nearest supply and railroad point. Oakley is a cozy home town, of 1200 to 1500 people, nestled on the flood plain between and above the confluence of Birch and Goose creeks. Northward, toward Burley, Idaho, the valley expands into the wide Snake river desert. From the camp eastward through Junction valley an auto road leads via the silent "city of rocks" to Almo and Albion in Raft river valley, thence southeastward on the Burley highway to Ogden and Salt Lake.

Historical—The Pioneer Period

Like the seasons, others have come and gone, until now Frank J. Lake is the lone remaining pioneer of the half-century-old Vipont mines. This sturdy and grizzled frontiersman and miner, with the faith that was in him, has remained steadfast and undaunted through more than a quarter of century of delays and disappointments, and lived to have his unshaken belief in the virtue and value of the camp finally verified by actual production. Mr. Lake knew William Vipont in his day, and is authority on the early history of the "diggings."

The story goes that John and William Vipont were roving hunters and prospectors from New York state; that while hunting the hills John Vipont found the ore on what he named the Homestake claim, and showed it to his brother and Hank Dake, the discoverer of the Delno district, Nev., who was at the time a member of the party.

*Mining Geologist, Salt Lake City. District personally investigated and article specially written for and at the solicitation of the Mining Review.

Another account gives "Indian Jack," a Shoshone native, credit for taking John Vipont to the outcrop and showing it to him for a small consideration. Whichever is right, the Vipont brothers were the first locators, made the basin their winter rendezvous, hunted, trapped, prospected the ground, and abided thereabouts for eight or ten years before they recorded the Homestake, Argenta and Lexington claims, in 1873. Finally they abandoned the ground and moved to Butte, Montana; thence down to old Mexico, where John Vipont was killed by a Mexican. This is the story as it was told to Mr. Lake by William, who revisited the district with a burro outfit some eighteen years ago.

When the Vipont brothers' title lapsed, Dave Fenstermaker, another picturesque frontiersman—and, it is said, a noted booze and Indian fighter of bye-gone days—relocated the Homestake and Argenta claims. After representing and recording them, it is told that he traded title to the property for a stack of "cotton tails"—white chips—and lost them in a poker game. When the poker game was over, the winner sold to Dr. White and Mr. House, of Salt Lake, who owned and worked the property for a time and sold it again to Dodge and McLaughlin, also of Salt Lake. Dodge and McLaughlin made several shipments of high-grade silver ore to the Old Telegraph smelter in 1892 and 1893.

In 1895 Dodge and McLaughlin sold the property to J. H. Paris (recently deceased), and Frank J. Lake who, together, organized the Vipont Improvement Company, which held title from 1895 until May, 1919, when the present operating Vipont Silver Mining Company took over the group, superseding all old titles and concerns.

The Vipont Mine

For the first time in its history the Vipont mine is now being operated in conformity with modern methods and equipment. The installation of hydro-electric power and light, telephones, air drills, aerial tramway and flotation at the mill, have ushered in a new era for the district, and a future that is fair and promising. Operations are in the hands of a staff of alert, up-to-date young engineers, with Frank Wardlaw at the head as general superintendent of mine and mill, ably assisted by M. A. Roche as second in command—together with their aides and lieutenants, Hess, Petersberg, Duff and Adamson, the assayers, and down the hill the mill crew—are giving an exhibition of team-work that is winning substantial results. There are no Silurian fossils on the staff or pay-roll of the Vipont company.

The property consists of 52 patented claims, about 1000 acres in all. The main working adit is 1600 feet long, driven northward toward the quartzite ridge, and the "mother lode" lime, which it cuts at a vertical depth of 200 feet and a slope depth on the deposit of 600 feet; thence along the strike of the deposit northwesterly and southeasterly there are several thousand feet of drifts, levels, stopes and sub-galleries from which ore is being mined.

The ore makes in a 50-foot stratum of somewhat broken blue, slightly carbonaceous limestone, below an impervious black carbonaceous shale hanging-wall country, and over a 50-foot sill of trachite-porphry that intrudes between the ore and the schistose quartzite bed-rock formation. There is some shearing movement, slickensides and rubble ore along and below the shale hanging walls, where bonanza nests of wire silver are frequently found. Such movements have fractured and locally shattered the mother lode lime, but have not seriously displaced it at any point observed. The lime does not appear to have been subjected to much alteration or change. It has not been noticeably replaced

or substituted with other minerals or metals. The enclosed druses and vugs have not been filled with any exogenous minerals, yet are frequently lined with secondary wire silver. The metallization of the lime appears to have been largely a process of porous absorption and reduction without alteration, instead of much metasomatic replacement.

The presence of base metals, such as lead, zinc, and copper, are insignificant, amounting altogether to less than 1 per cent in the crude ore. The silver is intimately associated with small quantities of iron, arsenic and antimony sulphides and arsenides. Rhodocrosite, the carbonate of manganese, locally impregnates or replaces thin seams of calcite along fracture planes; it is also intimately related to silver enrichment and is always in evidence where the ore is primarily of good grade. The distribution of the silver in the lime is erratic and variable both in width and grade, varying from two to fifty feet in width and five to 500 ounces per ton of silver. On the whole it is a milling proposition of more than ordinary size and promise, and is being worked as such by the company.

The ore is hauled to surface, seven cars to the trip, by mules and dumped into the head terminal of the tramway, where it is crushed before going to the mill. The aerial tramway is a continuous-load high service affair, 4200 feet long, erected by Davis and Howe of Salt Lake. It carries 27 buckets and is driven by a 15 H. P. motor.

The Mill and Processes Employed

The mill is situated at the bottom of the hill, 4000 feet west of the mine workings and about 500 feet lower. The previously-crushed tramway product is first passed through a large-size set of corrugated rolls which breaks the mill-feed down to 1-inch size. This product is belt-conveyed to an 8-foot Hardinge ball mill that grinds the ore down to about 40-mesh for flotation. The pulp passes through two Dorr classifiers where the oversize is returned to the Hardinge for re-grinding, the fines passing on to a sludge tank, with baffle mixer, where it is thickened before being fed into four large Janney rougher flotation cells. The bubble stream from the roughers is elevated and passes through two cleaner cells, the cleaned mineral falling to an Oliver filter for dewatering. The end-stream from the two cleaner cells is divided and passes over three Wilfleys and one Isbel table for final cleaning. The concentrates from the tables pass on to the Oliver filter, also, where both products are de-watered to a content of about 15 per cent moisture, when it is ready for shipment.

At the time of visit, June 15th, the company was working 150 men at mine and mill together, and mining and milling 150 tons of ore per day.

The Idaho-Utah Company

Adjoining the Vipont on the northwest and below the mill, the Idaho-Utah Mining Association, owning a group of 24 claims, is driving an adit northeastward into the mountain to tap the "mother lode" lime. This work has attained a present length of 500 feet, having passed through two narrow beds of ore already, one at 400 and the last at 450 feet, yet the mother lime is thought to be still about 200 feet farther ahead in the mountain, and is expected at 700 feet from the portal. Like the Vipont this property has an ample supply of water for milling purposes, and is well located for economical operation. Frank J. Lake, veteran miner of the district, is in charge.

The Apex or Skoro Con. M. & M. Co.

The Skoro Con, consists of a group of ten claims that adjoin the Vipont on the southeast. About 1000 feet southeast of Vipont camp this company is driving an adit east-

ward toward the main quartzite ridge, and the tunnel is now about 500 feet. Up in the basin a thousand feet east and ahead of the adit, two shallow shafts have been put down in black ground from which good assays have been reported; the shafts are caved and inaccessible at this time. The face of the adit is still in trachite west of the ore-lime and quartzite. A short distance south of the adit the trachite cuts abruptly to the southwest into a heavy blue lime formation above the black shale.

The Sullivan Group

A mile south, in Water canyon, the Sullivan group of fifteen claims is being developed by Frank and Joe Sullivan, of Park City. Some tunneling has been done and good assays reported from the trachite contact with the blue lime.

Lucky Bird Group

The Lucky Bird group of six claims is owned by T. W. Bird, and others of Vipont. These are new locations with no work done. The group is about two and one-half miles southeast of camp and laps over the watershed into Cotton Thomas basin.

Other Locations

O. E. Blair of Vipont has recently located the Silver Thread group just over the Idaho line, north of the Idaho-Utah group, and reports finding the mother lime and fair silver values on the surface.

Northward toward Oakley, locations in several places along the belt show more or less ore. These are strung along for ten or twelve miles, and to within about eight miles of Oakley, where the belt is said to swing eastward across Birch creek into the next range. East of Birch creek good assays, and ore in places, are reported by Fairchild, Bates and others.

Province Geology

The mining district with its fixed surface boundaries and local recorder, like precinct or township, is in the nature of a political subdivision within a state or county. The areas covered by such districts are usually limited to a central camp, water shed or other local features, and were formed to accommodate resident interests, and include all of the mining properties and prospects within tributary range. A mining district so organized may or may not cover a metallogenic province.

Waldemar Lindgren in his "Mineral Deposits," and V. H. Emmons in his "Principles of Economic Geology" describe and define the meaning of minerogenetic and metallogenic provinces and epochs. Both authorities cite the California gold belt, that is ten miles wide, ninety miles long, crossing three counties, and along which a dozen or more mining camps are located, as constituting a single metallogenic province. Such provinces, then, are the entire areas over which a given set of igneous and mountain-forming agencies have operated genetically to form veins and deposits of the useful metals; and their epochs are their relation to geologic time.

In Professional Paper No. III, "The Ore Deposits of Utah," U. S. Geological Survey, 1920, at page 100, a small sketch map marks out these "uplift provinces" in the state. If consulted, it will be observed these uplift provinces are everywhere transverse to the general north and south trend of the Basin ranges, or along east and west lines. The map shows, for instance, that Park City, the Cottonwoods and Bingham are all in the Uinta, a single east and west uplift province. It also shows the "Deep Creek-Tintic Uplift" extending on west into Nevada.

In the northwest corner of the state the "Raft River

Uplift" is indicated. The "Raft River Uplift" does not end in Utah, but continues between the Snake river on the north and lakes Lahontan and Bonneville on the south. This uplift extends from Curlew Pass, north of Kelton, westward to Gold Circle, Nevada, a distance of about 200 miles, and this as a whole, we will name the Bonnaville uplift. Now, most if not all of the mining districts in northeastern Nevada and northwestern Utah are located along and are genetically related to this uplift, and Vipont is one of their number.

Bonneville Uplift Province

This is one of the most pronounced orogenic movements in all the Great Basin region. An area ten to forty miles wide north and south and 200 miles long, east and west, has been involved. The south fault-scarp of this transverse deformation is followed, roughly, by the Southern Pacific railroad from Lucin, Utah, westward to Elko, Nevada, over 100 miles. Farther north along the crest of the main uplift, all of the Basin ranges are interrupted and thrown into distorted confusion; and along the south flanks there are several minor folds, where intrusives appear, parallel to the main uplift.

Along the watershed, or median line, there are stocks and batholiths of grano-diorite, diorite and syenite, including their porphyritic andesite, trachite and monzonite phases, and all of which are intermediate to basic in composition. As all of the Tertiary sedimentaries and extrusives have been tilted and warped, progressively from early to late, by the uplift, it is apparent these repeated deforming movements continued from late Cretaceous to the close of Pliocene time. They have also affected climate, vegetation and soil conditions profoundly.

On the south flanks, the indigenous cedar, nut pine and sages fade out rapidly as the north-trending ranges approach and become involved. The main ridges and north flanks are almost treeless grasslands, with only scattered clumps of white fir and mountain mahoganies, in place of the cedar, nut pine and sages. And this particular highland province has long been known as the best grass land and stock range in the Great Basin region.

In Elko county, Nevada, between Gold Circle and the Utah line, there are a number of mining districts located on both watersheds. From west to east on the Snake river slope are Tuscarora, Mountain City, Jarbidge, Contact, and Vipont, Utah. On the Lahontan-Bonneville slope are Gold Circle, Delno, and Park Valley, Utah, and a number of other less known districts on both slopes.

It is a help to know something of the character, composition and surface appearances of the intrusive igneous rocks that are the supply sources for the metals of veins and deposits in a given province, since they exert an important control on the quantity and kind of metals deposited. In general, in the Great Basin cordillera, these intrusives are intermediate to alkaline in composition, or below the highly siliceous granites, and rhyolites on the one hand, and above the basic gabbros, diabases and syenites, in silica, on the other. As field rocks, they are granodiorites, diorites, monzonites, trachites and syenites.

All of these clans and families of intrusives are represented in the Bonneville uplift. As a rule they appear in east and west trending stocks and batholiths, but do follow north and south courses in some places, and show andesitic overflow and dike arrangement, in some districts. Their usual habit, however, is plutonic, and their colors range from light gray to gray, gray-brown and greenish black.

District Geology

After the above presentation of general province geology, the local conditions met with at Vipont are relatively simple and readily understood; and there are no unique nor unheard-of peculiarities to puzzle over or unravel. In the Vipont district there are two main ridges; one north and south, the other east and west. On the east, the north and south ridge of the Grouse Creek range is made up of a complex 7000 to 10,000 feet of pre-Cambrian bedded, siliceous granites, which shade into schistose-quartzite at the top. Eastward these ancient crystalline rocks expand and cover a wide area of island proportions. This bedrock formation trends north and south and has a gentle slope to the west of about 20 degrees, into a pronounced geo-syncline.

The east and west ridge that forms the watershed, three miles to the south is mainly paleozoic limestone and shale and forms the crest of the Bonneville uplift, which has transversely interrupted and broken the orderly course of the north and south quartzite ridge. About a mile southwest of camp, a wide intrusive stock or batholith of a normal alkaline trachite, rises from the geo-syncline or trough and strikes southwesterly along the uplift ridge. The sheet or sill of trachite-porphry that follows above or below the "mother lode" lime is an off-shoot from this parent mass. So it appears that the mother lime is the negative property or receptacle which has been impregnated and has absorbed and reduced the silver and other metals, generated and evolved by the trachite sill, as the mineralizing agent.

While regional metamorphism is pronounced, evidence of contact-metamorphism is lacking beyond the described metallization of the mother lime; and since there is no apparent contact-metamorphism, nor near-surface deposits such as quicksilver, native sulphur and other solfataric or hot springs minerals, these manganiferous silver ores have been formed in shallow to intermediate depth, or in what is frequently termed the "bonanza zone."

Epochs and Age

Within metallogenic provinces the different ore deposits and vein system are not always of the same age, kind and character, nor in the same formations at all places. Variation in depth, age and environment tend to change these relations, though derived from a general, constant province source. In the Basin range provinces, only a few of the ore deposits are older than late Cretaceous time; and most of them are of still more recent age than the Cretaceous. In the Grouse Creek basin, some fifteen miles south of Vipont, a coal measure of middle Tertiary age is tilted along an east and west fold to an altitude of fifteen to twenty degrees. As the nearby Vipont deposits in the same province have not been appreciably disturbed or faulted by post-mineral movements since their deposition, we can conclude they are of late Tertiary age, and about coeval with those of Tonopah, Cripple Creek and the Comstock.

Camp Comparisons

Geology is of no value to the miner when he cannot understand or apply it to his own business and benefit. There is already too much high-brow stuff of this kind in print, and the authors of it have only a few select and highly technical friends that can or care to read it. This is all right, too; but since the miners have to spend their money and do the work, they have a first claim and right to any provident advantages the science can give them. The writer essays to be practical and hopes to be clearly understood by both geologist and miner.

We hear of gold camps, copper, lead and zinc camps, veins and deposits; and mixed ore-camps—the most nu-

merous—such as Park City, Bingham and Tintic, that produce gold, silver, copper, lead and zinc, and all commercially; and we hear them called silver camps, too, but this is not properly so. Then what properly is a silver mine or camp and are there any? Yes; there are three kinds of silver mines. For instance, the Tonopah-Comstock type, the Cobalt, Ontario type, and the Aspen-White Pine type.

Vipont is a silver camp and is comparable to Aspen, Colorado, Treasure Hill, of White Pine, Nev., and the Mono-Elk-Treasure mines in Dry Canyon, Utah.

In all of these wide apart places, there is a black, carbonaceous shale cover, lime and spar gangue, only slight evidences of alteration, replacement or silicification and negligible quantities of the base metals. The ores are always soft, blue and black, and the silver is associated with small amounts of iron, arsenic, antimony, rhodocrosite and carbon, in the order named.

Deposits of this kind, containing little or none of the base metals, never present highly-colored, showy outcrops to the prospector and miner, and may be overlooked. Vipont camp is no exception to the rule, and looks like a lime quarry, if you want to know; and we can all be our own experts now.

FAMOUS BRITISH COLUMBIA MINE SOLD

The Famous Standard mine, at Silverton, which contributed millions of dollars to its stockholders in the past, is to be sold for \$75,000. Negotiations for its sale were opened by the board of directors of the company several weeks ago and ratified by the stockholders at a recent meeting at Spokane. The property will pass to New York people under a bond and lease which must be exercised within thirty days. The purchasers have not been revealed. Their acquisition will include mining claims, mill, tramway, dock and all other improvements. The improvements alone cost more than the price quoted to the purchaser.

The transaction will leave the company without a mine, but with a surplus of \$250,000 to \$300,000 besides the \$75,000 in prospect. This money will not be disbursed, but will be retained for the purchase and development of another property if it can be found. Several properties have been examined but none, so far, have been tied up.

"We sold the mine because we believed it was worked out," said an official. "The Standard was believed to have been worked out on three occasions, but as often yielded a new mineral prize to its persistent operators. Its dividend yields aggregate \$2,700,000 made under the Finch & Campbell management, a sum that is raised to \$3,000,000 by the surplus."

UTAH'S LOFTY MOUNTAINS

Utah has many lofty mountain peaks. Six of them rise more than 13,000 feet above sea level and nearly sixty rise above 12,000 feet, according to the United States Geological Survey. The highest mountain in the state is King's Peak, which has an elevation of 13,498 feet. Mount Emmons and Gilbert Peak, both in Utah, are also high mountains, reaching elevations of 13,428 and 13,422 feet respectively.

1610—Indians sold Manhattan Island for a keg of whiskey.

1921—Whites want to trade back.

You may be superior to the person to whom you are talking, but it is the height of ill breeding to show it.

DISCOURSE ON COAL MINE OPERATION

Closer attention to the economics of coal mining was urged by J. J. Rutledge, superintendent of the Central Experiment Station of the United States Bureau of Mines, Urbana, Ill., in an address delivered before the recent meeting of the Illinois Mining Institute. Changes which will reduce the cost of production and increase the amount of coal per unit cost are made necessary by the present condition of the coal market, Mr. Rutledge said.

"Coal is now selling with great difficulty," he said. "I have been told that screenings in Central Illinois are being offered for sale as low as 50 cents per ton, which is certainly far below the cost of production. Lump coal does not seem to have suffered as badly as fine coal, but there has been some cutting of prices in this grade also.

"Some of the mines in the Southwest have not worked since last December. Others, railroad owned mines or mines supplying railroad coal exclusively, are only working from two to three days a week. One operator with thirty years' experience in the Southwest district told me he had never seen a condition like the present one. He said there was no market for fine coal, yet he could not help making some fine coal, if he was to make lump coal and the loss he was compelled to suffer on the fine coal would compel him to charge at least \$15.00 per ton for his lump coal in order to come out even. One company has 56 'no-bill' cars of fine coal on the tracks and the railroads were refusing to furnish any more cars for the loading of fine coal."

Mr. Rutledge urged that there should be some changes in the methods of working coal. Special attention should be paid to greater recovery. In many mines at present worked by the pillar and room system, the maximum recovery varies from 45 to 55 per cent and the remainder of the coal is left in such a condition that it is almost impossible economically to recover it. In other words, Mr. Rutledge said, the coal is irretrievably lost. By improved mining methods, such as panel long wall or pillar and room retreating, the recovery can be increased from 45 to 55 per cent, which is the present extraction, to 80 or 90 per cent, with a considerable reduction in the cost of production.

"If, by the expenditure of an equal amount of entry driving and brushing, from 25 to 35 per cent more coal can be recovered, mining costs can certainly be reduced by adopting the improved methods of mining," he said. "Estimates of the amount that it is possible to reduce the mining cost by improved methods of mining vary from 15 to 25 cents per ton. Moreover, the quality of the coal produced by these methods will be better than that produced by the old method and this will be an additional amount on the right side of the ledger. When our coal is gone, it cannot be replaced and is gone forever. Coal cannot be grown, like wheat, year after year."

Proper scientific study of subsidence would be of great economic importance, Mr. Rutledge said. As an example of the economic importance of such a study, Mr. Rutledge cited an important coal field where the pillar and room method of mining prevails. This field is now producing an amount of coal which has a royalty value of \$300 per acre. Under a proper system of mining, involving good recovery, this amount should be increased to at least \$500 per acre, the surface and coal being separately owned. Is it not much better to mine this coal exhaustively and to neglect the value of the surface, when the difference between the coal and surface value is so great? he asked.

Mr. Rutledge also spoke for more rigid inspection of

boilers, the use of improved devices for underground haulage to replace the slow, troublesome and expensive animal haulage, and the use of improved mining methods to decrease the necessity for coal washing. He also expressed the belief that underground loading machines will soon be found at work in many coal mines, even as they are now in many metal mines.

"One of the greatest defects in the present system of mining is the loading of slate and rock underground and the transportation of them to the surface to be deposited on the rock dump," he said. "Every car of rock or slate hoisted to the surface at least takes the place of one car of coal and possibly two cars. In other words, if the miners were not loading a car of slate or rock, they probably would be loading it with coal. The driver would be hauling coal, a revenue producing load, instead of that which is only an expense and a waste. Moreover, it is necessary to maintain expensive dirt dumps on the surface in order to dump the dirt and this involves an expense. The haulage of heavy slate or rock in mine cars soon destroys them and tends to cause them to be in poor repair at all times. With a good system of mining, such rock or slate would be left underground where it belongs and where it certainly would do more good than on the surface. About the only use such rock or slate is put to after it arrives on the surface is for ballast on highways or railroads.

"Mine accidents and disasters are among the greatest sources of expense in mining coal. Under the dangerous methods of blasting coal off the solid that is followed in some states, fatal accidents to shot-firers are frequent. In one state, where blasting off the solid is almost universally followed, some mines have lost by successive shot-firers' explosions, as many as eight or ten shot-firers; that is to say, any one of several mines have had from eight to ten shot-firers killed in a period of time varying from eight to fifteen years. One mine is said to have actually lost fifteen shot-firers in twenty years of operation; one or two shot-firers having been killed at a time. The average amount paid for a shot-firer's death claim alone, not including damage to the mine and loss of output to the operator and of wages to the miners and other employees, has been from \$3,000 to \$3,500 each. Several recent shot-firers' explosions have cost the mining companies concerned amounts varying from \$20,000 to \$50,000, including damages paid to heirs of deceased shot-firers and repairs to underground workings.

"Surely, it would be cheaper, speaking only from a cold, money-making standpoint, to abolish such a dangerous method of producing coal and endeavor to mine the coal by use of mining machines and permissible explosives."

FRANK JANNEY GOES TO NEW YORK

F. G. Janney, who has been connected with the Utah Copper Company for the past sixteen years, working his way up from metallurgical engineer at Magna to general superintendent of mills, is leaving Utah to take advantage of larger opportunities offered in New York City.

On Thursday afternoon, June 30, the employees of the copper company surprised Mr. Janney with a beautiful, imported fishing-rod, reel and tackle as a token of the high esteem and regard in which he is held.

The gift was accompanied by a short address by T. F. Jennings, who spoke of the pleasant relations that have existed in the past, the ties that have been formed through association, and wishing Mr. Janney success in his new field of endeavor.

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MINING ASSESSMENT SITUATION.

Now that the efforts to have congress provide for the suspension of assessment work on unpatented mining claims for 1920 and 1921 have failed, mining claim owners who wish to hold and protect their properties, should have had their 1920 work done by July 1st—or they should at least be in actual possession and at work if the claim jumper is to be legally headed off. If the work for 1920 has been completed it would be wise to file notice to that effect with the county recorder—or with the district recorder, if there is one—without delay; or, if the work for 1920 is still in process of being performed, the notice of completion should be filed just as soon as the work is finished.

And again, as the relief measure passed by congress last December only provided for an extension of six months in which to do the 1920 work, the time provided by law for the performance of 1921 assessment work was not extended, it will be necessary to do this year's work by December 31st—or, as stated above, the claim owner must be in possession and working when the year expires. In other words, the old rule prevails now and will prevail until congress makes a change. The sentiment in metal mining regions evidently is practically unanimous that the

annual assessment work period should be changed from January-to-December, so as to make the assessment period begin with July and end with June. If the prevailing method of holding unpatented mining claims is to remain a feature of the country's mining laws—that is, that \$100 worth of work shall be performed each year on each claim until patent has been acquired—and claim owners wish to change the fiscal period, they should see to it that action favorable to their wishes is taken by congress before the present year expires.

A general revision of the country's mining laws is to receive early attention at the hands of congress and it is most likely that whatever is done for the benefit of metal mining will all be incorporated in the new, revised statutes, the features of which were presented in an article taken from the Engineering & Mining Journal and published in our last issue. The proposed new law will be printed in full in our next issue, if possible.

PROTECTION AND PIRACY.

The ways and means committee of the congressional house of representatives finally, a few days ago, submitted the new tariff bill. It is reported from Washington that it contains more than eighty thousand words; that its sponsors are not at all enthusiastic over its provisions; that it is likely to be "shot full of holes" by the senate when and if it is passed by the house in anything like its present form, and that, no matter in what shape it may finally be enacted into law, it will be eight or ten months before the country can hope for the relief it is expected to derive from its passage.

The lead miners of the west are not asking for a tariff on foreign lead for the purpose of inciting higher freight and ore-treatment charges. What they are asking for is a tariff that will permit them to compete, under the American standards of living and wages, with the lower costs and living standards of Mexico, for example. What holds true in these respect, we believe, does—or should—apply to every article and thing which is shipped into and sold in this country that comes into direct competition.

If our tariff builders are catering to or being influenced by interests that would take advantage of such protective revenue-raising measures to exploit and rob the people of this country to their individual gain; if the ship of state is to be scuttled by financial pirates who hold the best interests of the country in scorn, then it matters little whether a new tariff bill is passed at all.

What is needed in this country right now is that our law-makers, in dealing with tariffs and taxation, get down to business and represent the people who placed them in office. The United States is the biggest business corporation on earth. Its affairs should be conducted in the interests of all the stockholders. When that idea is recognized it will not be such a hard task to bring the country back to "normalcy."

Samuel Gompers, the noted veteran labor leader, was chosen president of the American Federation of Labor, at the annual meeting in Denver, for the forty-first time. He received 25,022 votes, against 12,324 for J. L. Lewis, head of the United Mine Workers of America, his only opponent. The followers of Gompers have frequently "kicked over the traces" in opposition to his policies and the conservative stand he has taken on many subjects affecting the federation and repeatedly have threatened to "fire" him. Just as often the steadier element in the organization has decided, with good judgment, to retain the same old skipper.

NATURE OF SHALE OIL OBTAINED FROM THE OIL-SHALE ASSAY RETORT

In the issue of the Mining Review of March 15 a full description, with drawings and photos to illustrate it, appeared an article on a convenient and reliable retort for assaying oil-shales for oil yield. The article was prepared and issued as a bulletin of the Bureau of Mines, Utah division, as "Reports of Investigations, Serial No. 2,229," by Lewis C. Karrick, assistant technologist. As this bulletin made no mention of the quality of oil obtained, and as many inquiries on that point was received, it was deemed advisable by Martin J. Gavin, oil technologist of the bureau and his assistant, Mr. Karrick, to issue a report on the subject. This they have done in Bulletin No. 2254. From this bulletin the following paragraphs are culled, omitting several comparative tables, etc., in order to gain space. The authors say:

Experimental work indicates that it is possible to vary the quantity and quality of the oil obtainable with the assay retort from a given shale by varying the conditions of retorting. As an example, some figures that are averages for several closely agreeing tests are shown below:

Average results obtained with assay retort on oil-shale from Soldier Summit, Utah.

Time of retorting*.....	1 Hr.**	2 Hrs.	5 Hrs.
Oil recovered, gallons	40.0	42.75	40.2
Specific gravity of oil.	0.898 (25.9°C)	0.889 (27.5°C)	0.877 (29.6°C)
Setting point of oil.....	32°C (90°F)	33.5°C (92.3°C)	33°C (91.4°F)
Unsaturation (cut to 275°C) per cent.....	47.4	43.8	40.6

*Time indicates period during which oil was being produced. In all cases, the spent shale yielded no more oil on further heating.

**Water condenser was used above air condenser as a precautionary measure.

It will be noted that the yield of oil for the 2-hour retorting period was 6.25 per cent greater than for the longer (5-hour) period and 6.88 per cent greater than the 1-hour period. The trend of the unsaturation percentage is also worthy of note. It was believed that the method which produced the greatest yield of oil would also produce an oil of better quality, but this does not seem to be the case. The oils produced by the longer runs are lighter (of lower specific gravity), contain a greater percentage of low-boiling constituents, and the lighter fractions contain a slightly smaller percentage of unsaturated hydrocarbons than the oils produced in the shorter runs. Except when a very rapid retorting rate is used, however, the difference in the qualities (so far as this can be determined by distillation methods) of the oils produced at various rates of retorting is not great. If the shale is retorted very rapidly, the yield of oil drops off to a large extent and the quality suffers greatly. For the particular shale reported in these tests a two-hour retorting period is most favorable for highest oil yields.

Since there is as yet no basis for comparison of shale oils on the results of commercial use, it is necessary to base comparisons on analytical distillations of the oils. Inasmuch as the quantity of oil obtained from a single run with the assay retort is insufficient for making an accurate distillation analysis, several runs must be made under identical conditions to obtain the required quantity.

The effects of different retorting rates on oils produced from the same shale, mentioned above, are brought out in more detail by tables showing distillation analyses of oils produced from Soldier Summit oil shale for two and five-hour retorting periods, respectively. The oil produced

at rates of much less than 2 hours was so inferior as regards both quality and quantity, that no effort was made to accumulate enough for distillation analysis.

Method of Distillation Analysis

Briefly, the distillation method consists in distilling 300 c. c. of the oil in a standard fractionating apparatus under definite conditions, taking fractions for every 25°C. The fractions are then separately examined.

The method of examining the shale-oil fractions is similar to that for petroleum fractions, with the following exceptions:

(a) Viscosities are taken at 60°C. (140°F.) instead of at 100°F. because of the high solid paraffin content of many shale-oils and of their higher boiling fractions.

(b) Unsaturation percentages are taken on two combined fractions; the first of those distilling up to 200°C., and the second those from 200° to 275°C., (both under atmospheric pressure).

(c) Setting points (instead of cloud tests) are taken on the "vacuum" fractions. The setting-point tests afford a basis of direct comparison (for content of solid paraffin) with commercial oils produced from shale in Scotland.

The oils made by the assay retort were produced under the conditions described in the paper on the assay retort, above referred to, except that the retorting time was purposely made longer for the 5-hour run. All other conditions were held constant.

It is interesting to know that the best oils thus far produced in the laboratory from both Scotch and American shales have been made in the assay retort. In no case, by any retort thus far used in the laboratory, have oils been made from American shales that are fully equal in quality to Scotch shale oils.

Production of Shale-Oils With Steam

Many believe that the use of steam in retorts will improve the quality of the oil produced and that oils of good quality can not be made without the use of steam. The * * * assay retort, without using steam, produces an oil from Scotch shales as good as that produced from the commercial Scotch retort in which steam is used. In designing the assay retort it was hoped that oil of good quality could be produced without the use of steam, as the equipment necessary to generate and use steam would have greatly complicated the apparatus and made it difficult to operate in the field. The assay retort has never been operated with steam, but it is not unlikely that the use of steam in it would slightly increase the quality of the oil it produces. Studies now under way may give evidence to this effect.

Many experiments have been made, however, with larger retorts in which steam is used, varying the amount of steam and rate of heating. So far the use of steam in any of the retorts dealt with has not raised the quality of the oil produced to that produced by the assay retort. Later studies with more favorable conditions may, of course, show great improvement by the use of steam. The point is emphasized, however, that the assay retort without steam, produces the best oil thus far made by the Bureau of Mines from American shales. It also produces, from Scotch shales, oil practically equivalent to that produced from the same shales in commercial operations in Scotland, in which steam is used. The assay retort should, therefore, be highly desirable for use in determining both

quantities and qualities of oil to be obtained from American shales.

The above must not be taken to indicate that the use of steam in commercial retorts is not necessary or desirable. The assay retort embodies principles that can not be so fully utilized in retorts of commercial size because of their practical limitations. Since these principles can not be fully applied in commercial types of retorts, the authors believe that the use of steam or other gases, in many cases, may be necessary to substitute for them. What these principles are and why the use of steam may largely replace them in larger retorts, can not be discussed in a report of this length.

RESUMPTION AT FAMOUS ALPS MINE

The reopening of the Alps mine, commenced under the direction of Superintendent Alex. Lloyd early in June, has already made remarkable progress. The property, which is situated about two miles east of Pioche, Nevada, on the strike of the porphyry dike and attendant ore-bearing fissures, is now owned by the Alps Mining Company, which is controlled by the Lloyd Mining interests and backed by capitalists of Salt Lake City.

The main vertical two-compartment shaft which is 4 feet by 9 feet in the clear is being substantially repaired, the new sets being composed of 8" by 8" and completely lagged with 2 inch material. The old gallows frame has been reset and a double collar set put in place in preparation for permanent and continuous operation. A blacksmith shop is in course of construction and all necessary equipment is being added as needed for economical working of the mine. A 32 H. P. Fairbanks-Morse gas engine is already permanently installed which furnishes power to run the hoist and a two drill compressor which will shortly be added to the plant. The hoist, known as the "West Coast" type, has a lifting capacity of 2,500 lbs. at the rate of 150 feet per minute and is geared directly to the shaft of the engine. A feature of this hoist is a mechanical reverse which adds materially to the ease and safety of operation. The complete power plant will shortly be housed in a building 32 by 30 feet in dimensions.

Since commencement of work underground the shaft has been retimbered to a depth of 75 feet and the most difficult part of this work has already been accomplished. When the 150-foot level is reached lateral work will be commenced, as at this point several promising ore veins occur. From these veins it is expected to extract ore for shipment and extensive development work has also been planned at this level from which a big production was made in the past. From the 150-foot level to the bottom, a further 150 feet, the shaft is in fair shape and development at the lower levels will be governed by the opening up of the ore-bearing territory above and the data thus obtained will enable the management to more intelligently follow and extract the ore bodies known to continue to depth.

The renewed activity at the Alps mine brings to mind the vicissitudes of the high grade days of Pioche, as the story of Pioche has been closely interwoven with that of the Alps mine which in those halcyon days produced approximately a million dollars from a quartzite fissure vein of gold, silver-lead ore which was stoped out over a length of several hundred feet and to a depth of 225 feet. The necessarily inadequate methods of mining, then the general practice, could not cope with the decline in silver and cessation of operations became necessary; not, however, until a large tonnage of material had been put on the dumps and stored as fillings underground. All of this then

second class ore is now considered as above the average of present-day milling grade.

There are three levels in the mine, at the 150, 200 and 300-foot points and extensive stoping has been carried on from all these levels. The Yuba dike, which has been the source of the mineralization throughout the Pioche district, was intersected by a drift from the 300-foot level at a point 150 feet from the shaft and about 40 feet of work was done on the contact with interesting results. The dike was proven by crosscutting to be over 40 feet in width and to be capped by the quartzite. The further exploration of this porphyry dike should result in the opening up of additional bonanza ore. Extensive fissuring has taken place in the formation adjacent to the dike and three of the ore-bearing fissures already proven in the property strike at an angle that should cause them to intersect at a point not far distant from the shaft and southwest of same. Development work is based on a close study of the geological conditions, which has been greatly assisted by the intensive development of adjacent property caused by the discovery of the bonanza ore body of the Stindt-Donohue lease and other important discoveries made during the past two years in close proximity to the Alps mine. Ore when discovered in this area is universally high grade, carrying from 5 to 10 ounces in silver to each unit of lead content and in addition an appreciable value in gold.

Litigation, which has held back the development of a number of good mines, fell heavily upon the Alps mine, culminating in the wanton damage of the working shaft by the explosion of two boxes of high explosive within forty feet of the surface. This litigation is now completely cleared up and the damage done to the shaft has been repaired, and with capable local management the Alps should shortly enter an era of profitable productive prosperity that ought to eclipse the fine record of its early days.

U. S. SMELTING AND MINING REPORT

The directors of the United States Smelting, Refining and Mining Company have issued the following report from Boston:

"The consolidated earnings for the first months of this year are estimated at \$872,497 after providing all interest. There have been deducted from these earnings reserves of 435,882 for depreciation and depletion and \$131,065 for further exploration work in Mexico. These reserves aggregate in all \$566,947, and have estimated net earnings for the five months of \$305,550 of which \$84,219 was earned in the first quarter. The preferred dividend requirement for the five months' period is \$702,260.

"Our power supply in Mexico, on which production depends, has been substantially curtailed owing to a very dry season. The rainy season now setting in will materially improve this situation. The demand for foreign silver has been sufficient to absorb the Mexican silver production, and with any improvement of conditions in India and China increased earnings in Mexico may be hoped for.

"During the first five months of this year the output of coal was 328,935 tons as compared with 606,221 tons in the same period last year. This decreased output has increased operating costs and the earnings of the coal and railroad companies were small. The unsatisfactory showing of these properties in April and May was partly due to seasonal conditions, but it is expected that the demand for coal will begin to improve during the next few months as is usual during that period of the year."

LAND OFFICE ATTITUDE ON OIL

"It is the intention of the land department to give the 'little' man a chance to develop oil under the mineral land leasing bill, but he has got to show us," said United States Land Commissioner William Spry, while in Salt Lake recently, in conference with division chiefs of the field service. "We propose to allow the small permittee every opportunity to develop his ground, but we will not permit him to hold it longer than the prescribed period for speculative purposes."

Commissioner Spry made it clear that it is the policy of the land department as far as possible to aid the development of the West. To this end it is intimated that where a man has asked for a permit to look for oil, he will be given every opportunity to have that look.

"The department will look into the particular circumstances of each case," said the commissioner. "If we find that a bonafide effort has been made, either by the individual or the associates he may bring in, to begin drilling operations, and if investigation shows that further time should be given him if he has not been able to meet the exact requirements of the law, then further time will be granted over the six months now provided by the statute. There is a large discretion lodged in the secretary of the interior and the land commissioner, and it is planned to exercise it, if it can be done in the interest of development."

"We do not propose, however, to allow the holding of permits for speculative purposes. It would be obviously unfair to allow hundreds of holders of permits on a given structure to sit idly by while some one else drilled, to determine the value of that structure and then ride on the tide of fortune if oil were found. They will have just the time prescribed and no more."

It is estimated in land office circles that the government will go even farther in the effort to further oil development. Cases have already come to notice, it is said, where protests have been filed because certain permittees have not started drilling operations.

The answer in these cases has been that such protests could not be entertained, since the government is the best judge as to the good faith of the permittee. In other words, it is proposed not to cloud the issue with a mass of protestations from still others who are anxious to get in on good permits if they could throw the original applicants out.

TECHNICAL OIL MEN WANTED

The petroleum experiment station of the United States Bureau of Mines at Bartlesville, Oklahoma, plans to enlarge its program of work and to employ a few additional technical men for conducting the different investigations. Funds for this work are provided by the State of Oklahoma, and for that reason it will not be necessary for applicants for the new positions to take civil service examinations. Persons interested should write H. H. Hill, Superintendent, Petroleum Experiment Station, Bartlesville, Oklahoma, furnishing a statement of their education, experience, and positions held and salary, together with a photograph taken within the past year. The following is an outline of the positions open and the qualifications for each:

Petroleum Engineer for Work on Water Problems—Applicants for this position should be graduates from a college or university, with a degree in geology, or in mining, mechanical, or civil engineering. The applicant should have had at least five years old-field experience, of which

at least three years should have been on work connected with the development and production of petroleum. The applicant also should have had considerable experience in the solution and correction of water problems in producing oil and gas wells. Salary range \$3,000 to \$3,600 per annum.

Expert Driller—Applicants for this position should have had at least five years actual drilling experience with cable tools; also experience in shutting off water by the use of mud-laden fluid and cement. Preference will be given to a man who has had supervisory work in connection with mudding, cementing, and plugging of wells. Preference will also be given to a man who has had rotary drilling experience. Salary range \$3,000 to \$3,600 per annum.

Natural Gas Engineer—Applicants for this position should be graduates from a university or college with a degree in engineering, preferably mechanical engineering. At least five years' experience in work connected with the transmission of natural gas is required. This experience should include a knowledge of methods of metering natural gas, compressor stations and field equipment. Preference will be given to a man who is familiar with field conditions and who has had experience in the determination of pipe line losses. Salary range \$3,000 to \$3,600 per annum.

Assistant Petroleum Engineer—Applicants should be graduates of a college or university with a degree in geology or engineering. Applicants must have had at least one year's field experience in engineering work as applied to underground problems in oil fields. Salary range \$1,800 to \$2,400 per annum.

STRIKE IN THE AUSTIN

C. W. Earl, who came down from American Fork canyon to celebrate the Fourth, reports a most important strike in the Austin property, of which he is superintendent. The new strike was made in a twenty-foot upraise from the old Austin tunnel, and consists of about eighteen inches of high-grade sand carbonate with liberal chunks of solid galena scattered through the vein.

The strike looks so good that a shipment of ore sacks were ordered and taken back with the men when they returned to camp. The miners have not developed the strike sufficiently to determine its extent, but from all appearances they are just on the outside of a big body of approximately \$100 ore.

Superintendent Earl also reports another important strike in the same tunnel, but about seventy-five feet from the other. This is the opening of a four-foot fissure liberally sprinkled with chunks of gray copper, some of which assay as high as sixteen ounces silver, eighteen ounces in gold, 16 per cent copper and 40 per cent lead. This formation is so loose that timbering will be necessary before the extent and real significance of the strike can be determined.

The Austin company last year drove a 300-foot drift from the old Earl-Eagle tunnel to within about 100 feet of where it should intersect the fissures opened up last week. An extension of this drift would cut the two fissures at a depth of about 400 feet deeper than they were encountered above, but Mr. Earl says that he will "follow the ore," at least until it is developed to a reasonable certainty that the ore goes down.

John F. Bradshaw, Jacob Evans, J. C. Jensen, C. W. Earl and Edward Southwick are the chief officials and stockholders in the Austin company.

Around the State

Edward W. Packard, who owns the controlling interest in the Gemini mine at this place, is now in the state and according to Manager Jackson C. McChrystal, he will visit Eureka before returning to his home. Mr. Packard makes his home in the east and visits Utah once each year. It is understood that there is a likelihood of the Gemini mine being reopened below the water level just as soon as mining conditions are more favorable.

Articles of incorporation filed with Clarence Cowan, county clerk, by the Utah Flotation Oil and Asphalt company, incorporated for \$100,000. Incorporators are Guy Anderson, president; M. L. Nebeker, vice president; Leslie G. Young, secretary-treasurer; W. D. Nebeker, B. D. Nebeker, H. W. Doscher and Albert Alt. The company has acquired certain property in Boxelder county in payment of stock.

Manager Cecil Fitch of the Chief Con. states that preparations have been completed for sinking what is known as the "Water Lily" shaft of this company. It is a three compartment shaft which was started last year and during the past few months machinery, shaft timbers, etc., have been delivered on the ground. The campaign of work has all the appearances of permanency and it is barely possible that sinking can be continued throughout the remainder of the year. Mr. Fitch says that three shifts will be used, which insures excellent progress with the work.

The Dutchman Coalition Mines Company of Salt Lake, with a capital of \$10,000 divided into 1,000,000 shares of the par value of 1 cent each, has filed articles of incorporation with the secretary of state. The capital stock is taken over by Harry W. Holden, who gives in return five claims to mining property in American Fork Canyon. The claims are the Wild Dutchman, first northerly extension of the same, New Ideal, New Security and Dutchman Flat; also a mill site. N. Salmensen is president; Joseph R. Haas, vice president, and Harry W. Holden, secretary and treasurer.

New developments in the Iron Blossom, says the Eureka Reporter, have just taken place in the raise about 100 feet above the 600 level of the No. 1 workings. Frank Birch, local manager for the Knight companies, says that copper-silver ore of commercial grade has been encountered. Some of this ore is suitable for treatment in the Silver City mill and the remainder of the deposit contains sufficient values to make it a smelter product. Mr. Birch says that this ore has been encountered in an undeveloped section of what is known as the "west channel," and in a part of the company's ground that really ought to carry a large ore body.

While no definite information has been given out it is understood that there is a likelihood of work being resumed at the Centennial Eureka and Bullion Beck mines. It may be another month or six weeks before these mines are reopened but it is hardly probable that they will remain idle for a longer period. The smelters of Utah have pretty well cleaned up on their surplus ore and such properties as the Centennial Eureka and the Bullion Beck should soon have an opportunity of shipping. The large hoisting engine at the Beck is being repaired and put in such condition that it can be placed in operation on short notice. Supt. Enlund says all of the machinery will be overhauled.

Yes, there will come a time when flying is safe for many people. Gabriel will furnish the wings.

Personal Mention

W. G. Adamson, of Winnemucca, Nevada, was in Salt Lake last week on mining business.

A. G. Burritt left for Idaho Monday last to make an examination of mining property for local clients.

L. F. Paddison, recently of Salt Lake City, is now with the Cia. de Real del Montey Pachuca, Pachuca, Tgo. Mexico.

L. R. Kimble, Dayton, Nevada, is anxious to locate and hear from S. A. Fisher, a mining man who was at Escalante during the past winter.

C. W. Plumb, formerly with the U. S. Smelting, Refining & Mining Company at Salt Lake City, is manager of the Crater Mining Company at Crater, Arizona.

William T. McDonald, mill superintendent for the Moctezuma Copper Co., Nacozari, Mexico, was a recent visitor in Salt Lake.

John F. Cowan, the well known local mining man, has got into the oil game on the coast. His San Francisco address now is 610-341 Montgomery St.

R. C. Gemmell has been elected a director of the Nevada Con. Copper Co., and Louis S. Cates, a director of the Utah Copper Co., replacing William Potter, resigned.

H. E. Clement, the well known mining engineer, who has been doing professional work in Nevada for more than a year past, is home again, at 963 E. South Temple St., Salt Lake.

M. J. Farrell, president and manager of the Old Veteran Mining Company in the Coeur d'Alenes, has returned to Wallace, Idaho, to have work resumed on the property on Canyon Creek.

O. B. Hofstrand, metallurgical engineer of Salt Lake City, Utah, has recently returned after having completed an extensive investigation of the Tintic Milling Company's plant and process at Silver City, Utah.

Dr. George Thomas, state superintendent of public instruction, has been selected by the board of regents of the University of Utah to succeed Dr. John A. Widtsoe as president of the university. Dr. Widtsoe resigned on the first of the month.

J. Park Channig, vice president and consulting engineer of the Miami Copper Company, was a recent visitor in Miami. Mr. Channing was a guest of the Miami Rotary Club during his visit, and at a luncheon meeting stated that the Miami Copper Company expected to continue operating indefinitely.

E. D. Lorimer, who heads companies operating uranium mines at Lusk, Wyoming, and below Green River, Utah, passed through Salt Lake on his way from Lusk to the Green River country, early in the month. On his way back he will go to Billings, Montana, before returning to Lusk, where his company is mining and shipping 3 to 4 3/4% uranium ore and receiving \$3 to \$4 a pound and better for the product. The property in Wyoming is close to Lusk, on the railroad and close to water, where milling and shipping facilities are ideal.

They were looking down into the depths of the Grand Canyon.

"Do you know," asked the guide, "that it took millions of years for this great abyss to be carved out?"

"Well, well!" ejaculated the traveler. "I never knew this was a government job."

ARIZONA

Approximately fifty men have been put on by the Inspiration Consolidated Copper Company recently at Miami on the Live Oak property of the company. The work is of a nature leading up to development work. A few more men will be added to this force.

Dan Rose, operating the Paul Jones group in the Rambo district three miles north of Globe, has uncovered some high grade silver after a month's exploration. Mr. Rose expects to sack some 1800-ounce silver ore and market it—just like he did some 25 years ago.

The stockholders in the Jerome Verde Copper Company are now exchanging their stock for that of the Jerome Verde Development Company pursuant to an agreement made between the former company and the United Verde Extension Mining Company on May 5th.

The bullion returns from the Tom Reed will show a decided improvement for the month of June, and a still better showing is expected during July. It will take some time to work the new ore body that is being opened on the 700 level to the best advantage. Supt. Phelps is striving with all his might to increase the ore reserves ahead of the mill.

John H. "Scotty" McEwen is reported to have uncovered what purports to be one of the greatest gold showings ever found in Gila county, in the Dripping Springs district, about two miles from the Cowboy mine. Mr. McEwen is a former employe of the Old Dominion at Globe. His find is not the result of the fictionized and accidental poking of a pick into a gob of gold.

The United Eastern is speeding up the new shaft next to the United Western. This work is creating more interest than anything that has happened in the camp for years. A great many people think the plant is on the United Western ground, as it is not far from the end line of the latter property. Mining experts believe the United Eastern will tap another bonanza ore body in this section.

The action of A. G. Keating against the Hackberry Silver Mines and Wm. Neagle and G. S. Holmes, was dismissed in the superior court of Mohave County, at Kingman. This action grew out of the failure of the consolidation of the Senate Silver and the Hackberry, which was to be carried through under the name of the Hackberry Consolidated. It is now understood that arrangements are being perfected under which G. S. Holmes and William Neagle are to assume control of the Hackberry and begin active operations. The mine has a big body of ore that carries values of sufficient importance to make shipment to the smelter profitable and it is probable that the extraction of this ore body will soon be under way.

COLORADO

E. E. Bush, a mining engineer of California, is opening up the O'Connell property in West Argentine.

The tram at the Snowdrift mine at Silver Plume is again in commission and they are now shipping a car a day to the Hudson mill.

K. C. Gunsolus of Buffalo, N. Y., one of the men interested in the work E. D. Payne is doing at Empire, was a visitor there, and is highly elated over the good showing being made in the Payne properties.

E. T. Hand arrived in Silverton from his home in Winfield, Kansas, and will superintend additional development of his Black Rover group in the Animas Forks country during the remainder of the season.

H. R. Trenholm who was here a few days last week from his headquarters in Provo, left again Sunday, says the Rico Item. He assures us that as soon as the prices of metals advances enough to justify it, the Wellington mine will resume operations.

W. L. Shaffer, general superintendent of the Freeland Development and Tunnel Company, at Idaho Springs, has started work on that famous old-time property, which has been lying idle for some time. The Freeland was one of the big producers in years gone by, and it is thought it will again become a good shipper.

Silver-lead ore, sampling as high as 200 ounces silver and 45 per cent lead, has been opened up on the property of the Blue Ridge Mining Company, located in the Montana Mining district, about one mile southwest of Dumont.

The Lady Ellen group, situate in the South Mineral district, and owned by the estate of Joseph Bordelleau has been bonded by Henry Sherman administrator to Angelo Mineoli and associates who have sent out a large amount of supplies and materials to begin an extensive development campaign. These men own an adjoining group and plan to work the combined group from the main level of the Lady Ellen. Their first plans call for upwards of 700 feet of work, says the Silverton Standard.

IDAHO

Seven miles from Hope, high up in the mountains, is the Auzer Gold property, where two shifts are employed.

At Clark's Fork a long tunnel is being driven by contract on the property of the Clarinda Copper Mining Company.

One shift is working the Margaret, twelve miles from Sandpoint. It is a gold property and owned by Spokane people.

At Hope a small force is working the property of the Hope Mining and Milling Company. It is a copper property, carrying silver and lead.

The Mineral Zone mine, at Elk City, is being unwatered for sampling and the Deadwood will be reopened by a Colorado syndicate, according to reports.

Ben Evans and Fred Rasmussen, who are leasing a block of Allie Company ground at Gilmore, are sending another car of ore to a Utah smelter, 33 tons being crude and the balance concentrates.

Around Pen d'Oreille Lake and in other parts of Bonner County are promising properties, according to reports from mining and business men of Spokane, who recently visited the Armstead property at Talache.

A tunnel is being driven a length of 1,100 feet in the American Eagle mine in the Dixie district by A. W. Boyd and associates. Its objective is a point under a shoot from which ore was removed several years ago.

The Bluebird mine is under lease and shipping gray copper that is said to run from 400 to 1,500 ounces in silver. A small carload was shipped two months ago and they are getting out another. The Bluebird adjoins the Armstead.

The Carpie Mining Company, with a copper property at Cabinet, is installing new hoist and compressor, and will sink the shaft from 300-foot level, its present depth, to 1,000-foot level. The vein on the 300-foot level at the point of the drift is said to be six feet wide in the face.

A streak on the surface of the American Eagle Mining Company's property returned 112 ounces in silver and 48 per cent lead. The values come from a contact vein along a dike 100 feet wide. The vein is from two to eight feet wide. About 1,400 feet of development work has been done. Sandpoint people are largely interested.

The camp of Gilmore is reflecting activity in many ways. The working shaft on the P. I. is being sunk from the 700-foot level, and other exploratory work pushed, with purpose of operating the mine on a larger scale than at any previous time. Manager Nichols is expediting equipment of the Latest Out, and will have that bonanza in full operation by the middle of July.

Spokane people are largely interested in the Lawrence Mining and Milling Company at Clark's Fork. The company claims to have the purest lead ore found in Idaho. Its lead content is said to be 70 per cent. Occasional shipments are made to aid in paying expenses of development. These shipments are from a small vein. A tunnel is being driven to cut a large vein. Joseph Reed is manager.

"The number of people in the central Idaho gold field is the largest I have noted in several years," said William F. Boettcher, a mining operator of Spokane, Wash. "This is due probably to renewal of interest in gold, which has become attractive since the decline of several other metals. Also, it is probably due in part to the lowered cost of labor and supplies, which make a profit possible in gold mining."

Ten inches of silver-lead-copper ore averaging \$105 is reported by W. M. Hollenback of the Falls Creek Mining Company, directly across the lake from the Armistead mine. A small crew is sinking in the vein. In addition to ten inches of high-grade ore there is much more of lower value. This company has a 50-ton concentrator, waterpower and other equipment, and intends to add flotation to save the silver values.

Three feet of high grade ore, said to be the finest yet found in the property, was opened up recently by the leasers of the lower workings of the Western Union Mining Company. It is expected to go high in silver. These leasers are loading another 50-ton car for shipment to the smelter that will run higher than any previously made. Other shipments have averaged 50 per cent lead and 44 ounces in silver. The crosscut has been extended 300 feet and the leasers expect to strike the vein in the near future.

"A drift on the deep level of the West Hunter mine at Mullan, lacks 200 feet of a point where it will undercut a surface showing," said Edward T. Davy, president. "The objective will be reached in a contract for 300 feet of work let recently and being executed. The footwall is good and the quantity of mineral in the vein is increasing. A vertical depth of 1,000 feet is attained in the operation. A distance of 850 feet has been driven from the American Commander tunnel through which entrance to the West Hunter is obtained."

Although there are not more than a half-dozen heavy producers in Shoshone county, which includes the Coeur d'Alenes, the government report shows that thirty-nine properties, large and small, contributed each at least a small tonnage in 1920. Idaho county had eighteen small pro-

ducers; Clearwater, five; Bonner, three; Latah and Benewah, two each, and Boundary, one. The one in Boundary was the Idaho-Continental, which had an output during the year of \$348,138 more than the production of all other counties of northern Idaho combined, except Shoshone county. In Washington Stevens county 15; Ferry, 8; Okanogan, 8; Kittitas, 4; Shohomish, 3; Clallam, 2; Whatcom, 3; Chelan 2 and King 1.

MONTANA

Some drifting is in progress on levels below the 2,000 in the North Butte property, with the driving of a raise or two under way. Operations in the main, however, are more on the order of simply marking time, meanwhile keeping the property in repair. Seventy men are employed.

Specimens of ore from the Spotted Horse mine in Fergus County, show some exceptionally high values in gold and silver, according to report. The mine has produced a large amount of high grade ore in the past. It is now being worked on a small scale, some new leads having been discovered lately.

A new company is being formed to take over the Liverpool mine in the Lump gulch district, near Helena, according to word received in that city. Boston and Detroit men are said to be interested in the corporation. The Liverpool is a silver producer. It was operated for several years, closing about three months ago. During the last period of operation more than \$250,000 worth of silver ore was shipped from the property.

Last year Anaconda produced and sold approximately 74,000,000 pounds of manufactured copper products. By reason of its location in the far West, the Anaconda Company has that field practically to itself through its ability to undersell Eastern competitors on account of the freight differential. Early in the year the company obtained an order for ten million pounds of copper wire from the Pacific Gas and Electric Company, which quantity has since been duplicated by the Western Union Telegraph Company. It was this six months' old order which was wired on from San Francisco.

NEVADA

R. S. Bolam, superintendent of the National Mine, at National, and well-known local mining engineer, is in San Francisco to undergo medical attention. He has been in ill health for some time.

C. B. Lakenan, general manager of the Nevada Consolidated Copper Company, has left for the northwest, including Canada and Alaska. Mr. Lakenan expects to be away several weeks and will combine pleasure with business, plans having been made to meet Dr. R. A. Bowdle, H. S. Monroe and Robert Marsh at Anyox, British Columbia, for a big-game hunting expedition.

The May cleanup of the Round Mountain Mining Company, at its placers on the southwest slope of the mountain, proved better than \$1.00 per yard for the month's operations. Louis D. Gordon, president of the company, who returned to Tonopah during the week after a week's direction of affairs at the mine, reports that from 24,000 cubic yards of dirt, a bullion shipment estimated to be worth \$26,000 was made to the Selby smelters.

Thomas Major, pioneer mining man of the Golconda section, is associated with Fred Backus in operating the Gold Coin mine, one of Mr. Major's properties in the Gold Run basin. They have a Gibson mill in operation and are meeting with great success in the milling of ore. The Gold Coin has been opened to considerable extent showing nice bodies of free milling gold ore. This property is about twelve miles south of Golconda, the railroad and supply point for the camp.

H. R. Lemaire and W. F. Collins of Battle Mountain were in Austin recently looking over the mining interests of the former. Mr. Lemaire has some mining ground at the old camp of Skookum, which they visited, and also at New York canyon. At the latter place on different occasions he has taken out some very fine shipments of high grade, and he expects to repeat the performance this summer. The last time he did any mining there he had out about \$4,000 worth of ore, all sacked and ready for shipment to the smelter, when some one beat him to it and carried off the ore. Mr. Lemaire says that this will not happen again.

Petroleum Notes

Bair Oil Company well No. 33 in Lost Soldier was completed at 1270 feet. Oil went over the derrick top and considerable flowed onto the ground before it could be placed under control.

Advices from Ely are to the effect that the Illipah Petroleum Company has succeeded in lifting the string of tools from the well. The management and men had been striving and fighting for seventy-six days to get them out.

W. P. Peterson of Oakland, California, after several weeks of negotiation in behalf of himself and associates has entered into contract with the Evans Oil Corporation and the Bergstrom Syndicate whereby some of the lands held by these organizations in Pine Mountain and Salt Creek will be brought to an early development.—Wyoming Oil World.

Union Consolidated Oil Co., operating in Big Piney has reached the cap rock at 1200 feet and casing is now being set preparatory to drilling in. This company recently took over the holdings of the Big Piney Oil & Refining Company in addition to its 160 acres adjoining the section on which Lincoln Idaho well No. 2 was drilled. Prospects are said to be excellent for a producer of considerable size.

Precautions against fire were taken this week by the Inland Oil and Refining Company well south of De Beque owing to a strong flow of gas having been encountered. A 10-inch casing-head control valve was received this week from Casper, Wyoming. It is so constructed that a complete shut off of the well can be made with the tools still in the hole, in the event a large flow of oil or gas is encountered.—De Beque News.

Claud Hegler, Supt. of the Virgin Dome Oil Co., was in from the well on Purgatory Flat Tuesday. Mr. Hegler says they have managed to drill past the string of tools that have been fast in the well for a considerable time despite all efforts to move them, and that he feels certain

they can now be withdrawn from the well as soon as a special tool arrives from Los Angeles, and this is expected to arrive any day now.—Washington County, Utah, News.

Captain J. F. Lucey, head of the various Lucey concerns engaged in the manufacture and distribution of oil well supplies, believes that the downward trend in the oil industry has touched bottom and that the business will witness a sharp upturn in 1922. He looks for a big improvement next spring when he believes the industry will find it necessary to make up in production what is being lost now in curtailment of operations to meet a greatly increased demand for oil throughout the world.

CARNOTITE MINING IS PROSPERING

A. W. Stevenson, president of the Pittsburg Radium Company, which is now operating its claims in Yellow Cat, south of Thompsons, is of the opinion that the carnotite industry is as good as it ever was before and he looks for extensive operations to start up all over the uranium district. The Pittsburg Company's camp was visited by H. W. Balsey, Floyd Trout, C. W. Wright, H. A. Hatch and A. F. McRae of Moab, and Mr. Stevenson told the Moab men that in his opinion the rumors and reports that carnotite mining is facing a slump are entirely without foundation.

The Pittsburg Company is now working a force of eighteen men on its holdings. It is also building a reduction plant at Denver, which will be in operation within the next thirty days. Mr. Stevenson said that the company intended to make vanadium its principal product, as it has a number of big orders for vanadium from steel plants in the east.

The fact that vanadium ores are in demand will be encouraging news to the carnotite operators of southeastern Utah. For the past six months there has been practically no demand for vanadium, operation being confined to uranium ores. If a fair price can be obtained for both products, the mining of carnotite ores will once more become a most profitable industry in this section.—Moab Times-Independent.

CONSTRUCTION NOTES

The contract for the construction of the water supply line to the Ogden arsenal was awarded to the W. H. Spencer Company of Salt Lake for \$58,000, according to a statement from the general offices. The pipeline will run from the Harbison springs, near the mouth of Weber canyon, to the arsenal buildings, a distance of six miles.

The Imperial Lead Mining Company, 406 Hooper building, Salt Lake, has filed two applications for the use of water in Tooele county, for use in the Erickson mining district in the development of properties carrying lead, silver, zinc and gold, and for domestic purposes at the mining camp. One of the applications is for ten second-feet to be developed in Death canyon through a concrete basin, dam and flume. The other is for two second-feet to be developed from an unnamed spring in the same vicinity.

ELEVEN FEET OF GALENA ORE

Report of what appears to be the most important news that has come out of American Fork canyon since the Tyngs opened up the bonanza shoot in the old Miller mine about twenty years ago was brought down from the Mary Ellen gulch by Carl Ferlin, superintendent of the American Leasing Company's properties ten days ago. Mr. Ferlin reports a face of eleven feet of almost solid high-grade galena is a tunnel run from the old Yankee into the Echo claim of the Silver Wave group, controlled by Kent Keyes and Salt Lake associates.

The strike is so promising and has been developed to such an extent that Mr. Ferlin placed an order for twenty ore teams to bring the ore down from the canyon, and says that he will be able to keep them busy until the winter snows stop operations in December.

In the bottom of the Mary Ellen gulch is located three Live Yankee claims, joining end to end for 4500 feet and only 200 feet in width. On one side is the Silver Wave group and on the other is the Belorophon group, all three being under lease to the American Leasing Company, with Carl Ferlin as superintendent and manager.

Last year Mr. Ferlin with a deep tunnel opened up about 50,000 tons of milling ore near the side lines of the Belorophon and Live Yankee claims. Apparently the milling ore fissure, which has a north-east-southwest strike, will cross the Yankee claim into Silver Wave ground, and the Silver Wave will only have 200 feet to get into Belorophon territory.

It was from this territory in the early days that about a half million dollars in galena boulders were picked up and shipped to the smelter then operating in American Fork canyon, and only about five years ago John Cleg-horn broke up a fifty-ton boulder near where Mr. Ferlin is now operating and shipped it to a Salt Lake county smelter. The Silver Wave strike will also be of interest to Globe Mining Company stockholders as the same fissure is heading toward the Globe side line about 600 feet distant.

W. A. CLARK VISITS SALT LAKE

"This country is too big and the people are of too high a grade to remain inactive long," said W. A. Clark, president of Los Angeles & Salt Lake railroad and former United States senator from Montana, on his arrival in Salt Lake on the Fourth. "The copper market right now is about the flattest thing I know of, but it will not remain that way. As soon as things get straightened out in Germany there will be a big demand for copper all over Europe.

"We could sell copper now, but would not get the price of its production, and I will not sell it that way. Others feel the same, and we have formed a pool in this country of \$40,000,000 to protect the interests of copper, having something like one billion pounds of it ready for the market. This doesn't mean, however, that the mines will remain shut down until all of this is disposed of. Just as soon as there is a demand and the product starts to move, the mines and smelters will begin active work again. I imagine it will be nearly a year before things get to going full blast again."

Despite the fact that Mr. Clark is in his eighty-third year, he is as active as ever. He arrived in Salt Lake before 5 o'clock and before most people were stirring he

was on his way to his mines at Ophir in Tooele county, Utah. He went all through the mines, or as much as time allowed him, with his usual keen interest, and departed at 1:15 o'clock in the afternoon for Butte.

"We are employing quite a force of men at Ophir," said Mr. Clark, "and doing some valuable development work. It is our purpose to be ready to turn out lots of ore when the market opens up.

"I am going to Butte and expect to remain there several weeks. Then I shall leave for San Francisco, from where I shall sail August 2 for Honolulu. I never have been to the Hawaiian Islands, and expect to enjoy my trip there very much. I shall take my golf clubs with me and get some exercise there. My family went out there several weeks ago and like the place. However, I cannot stay there long, as we must return to New York in time to get my daughter in school by the first of October."

SIX MONTHS' DIVIDENDS OF UTAH MINES

Depression of the mining industry is plainly seen in the decline of dividend payments by Utah mining companies during the first six months of 1921.

During the first quarter dividends of \$1,925,841.60 were paid by six companies. In the second quarter only three companies declared dividends, their disbursements totaling \$915,245, a total for the six months of \$2,841,023.20, compared with \$4,837,470 for the same period of 1920.

Reduction of Utah Copper quarterly disbursements to stockholders from \$1.50 to \$1 and then 50 cents a share due to low copper price, was the main factor in the huge decline. The Judge and Daly West Companies of Park City, which were regular dividend payers during the first six months of 1920, suspended dividends late in 1920 and have not yet resumed on account of low prices for lead and zinc.

Silver King Coalition of Park City, however, returned to the dividend class during the first quarter of this year following favorable outcome of its long standing litigation with the Conkling Company.

Bingham Mines Company, operating at Bingham and Tintic, which was a regular dividend payer last year has not paid stockholders this year. However, the company has purchased 50,000 shares or one-third of its capital stock, in the open market and returned same to the treasury of the company at a cost of \$10 a share.

Chief Consolidated and Tintic Standard, the two main dividend payers of Tintic were compelled to reduce amount of dividends on account of low price for lead and curtailed silicious ore shipments.

TINTIC STANDARD DIVIDEND

Directors of the Tintic Standard Mining company declared the regular quarterly dividend of 5 cents per share, payable July 9 to stock of record July 1. This disbursement, when paid, will bring the grand total of dividends to date to \$1,538,332. Last quarter the same amount was disbursed.

Cerro de Paseo Copper has passed the dividend on its stock. The last dividend was 50 cents, paid three months ago. For eight previous quarters \$1 a share was paid.

It used to be that the saloons were to blame for all the things going on in the world. Now it is the movies.—Los Angeles Times.

United States Smelting, Refining and Mining Company

Buyers of

Ores and Concentrates Matte and Furnace Products

Terms quoted for smelting ores, also for concentrating ores containing low percentages of both lead and zinc, on application to the United States Smelting, Refining and Mining Company, Newhouse Bldg., Salt Lake City. Smelter and lead and zinc concentrating and separating mills at Midvale, Utah; Copper smelter at Kennet, California; Zinc smelter at Checotah, Oklahoma; Lead and zinc concentrator at Needles, California; Lead refinery at Grasselli, Indiana.

*Insecticides, Fungicides, Weed Killer, Poison Bait, For Sale by Our
Agricultural Department. Newhouse Building, Salt Lake City, Utah.*

GOLD PRODUCTION AT COPPER CANYON

Copper Canyon is today producing more placer gold than any operating gold concern on the coast, says the Carson, Nevada, News. Following the court decision giving title to the ground to George Thatcher and associates, Ed. Malley, George Cole and Dr. MacLean, they at once made arrangements to work the placers on an extensive scale.

During the winter months water was piped in from a considerable distance, modern hoisting machinery installed and the latest devices in placer mining added to the equipment, the result being that this summer sees gold coming out of the deposit by the pound.

Recently Mr. Malley returned from the diggings and brought in the result of the first runs. Approximately \$3,000 worth of gold is now in the treasurer's safe and more is to come.

Some of the nuggets are valued at \$10, while numerous others range in value from 50 cents to \$5. The last run from the drift produced about \$18 per square yard, which exceeded expectations, as the gold was of unusually heavy nature.

A pickle bottle filled with fine gold is among the exhibits and when the bottles are sized up it looks like real placer mining.

Work is being carried on by the drift process. Shafts are sunk forty feet to bedrock and then drifts are started. The pay channel is about eighteen feet wide and six feet in thickness, and it is running into money at a lively rate.

Clean-up is made every night, while about twice a month some member of the party makes a trip to the camp and brings in the yellow metal. The gold is mining at \$18 per ounce, making a high grade product, and there is no difficulty in disposing of the metal to our Uncle Samuel.

From present appearances the owners will take out more than enough this season to square themselves with the world, and leave a balance. While it took a lot of nerve to buy a law suit, equip the property and put it in working order, the returns indicate the game was worth the chance.

The Copper Canyon placers are the richest so far found in Nevada and as stated above are producing more than any section in the west today.

ASSESSMENTS PENDING.

Alta Tiger Mining Co., $\frac{1}{4}$ c a share. Delinquent July 9. Sale day, August 1.

American Metals Mining Co., $\frac{1}{2}$ c a share. Delinquent May 22. Sale day, July 26.

Reads Peak Mining Co., 1c a share. Delinquent July 26. Sale day, August 8.

North Standard Mining Co., 1c a share. Delinquent July 31. Sale day, August 29.

Globe Consolidated Mining Co., $\frac{1}{4}$ c a share. Delinquent July 30. Sale day, August 26.

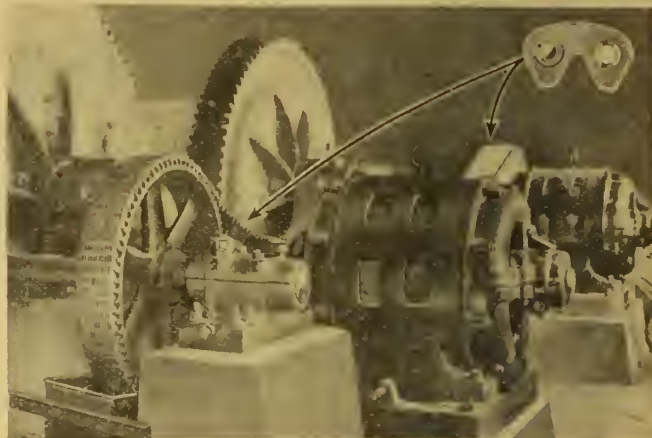
Grand River Placer Co., 10c a share. Delinquent August 5. Sale day August 25.

METAL MARKET QUOTATIONS—JULY 12.

Silver	99 $\frac{1}{4}$ c
Silver in London	367 $\frac{1}{2}$ d.
Copper (electrolytic, spot)	12 $\frac{3}{4}$ @ 13c
Lead	\$4.40
Zinc	\$4.25 @ \$4.35

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- 1 15 H. P. Van Severn Oil Engine
- A number of gasoline engines from 1 H. P. to 200 H. P.
- 1 No. 4 Roots high pressure flotation type blower
- 1 Garden City high pressure blower No. 2
- A quantity of new and used elevator belts 20-in. and 12-in. Manhattan Belt
- Elevator buckets from 6-in. to 20-in.
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- 1 10x6 $\frac{1}{2}$ x10 Ingersoll-Rand Imperial Type Compressor
- 1 8-in.x8-in. Curtis Compressor
- 1 No. 4 Fairbanks-Morse deep well pump complete
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Water pumps—various makes and types
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The Salt Lake Mining Review

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SALT LAKE CITY, UTAH, JULY 30, 1921

SINGLE COPIES, 15 CENTS

Huge Deposits of Strontium Ore Located in Millard County, Utah

The existence of a huge deposit of strontium carbonate ore (strontianite) has resulted from investigations recently made by F. L. Byron, of Delta, Millard County, Utah. The mineral is reported to be exceptionally high grade and, as the deposit covers an area approximately one mile long, 600 feet wide and 200 feet high above the surrounding marsh land in which it is located, there evidently must be millions of tons of the ore exposed. The deposit is located in southeastern Millard County, about five miles west of the little town of Meadow, some twelve or fifteen miles southwest of Fillmore and thirty-five miles south of Delta. It is about twenty miles by wagon road westerly to Clear Lake station on the Los Angeles & Salt Lake Railroad from the property.

This unusual deposit of strontianite is owned by Hy. Colby, A. L. Larsen, O. A. Potter and F. L. Byron, though the latter, it is said, has recently sold his interest for Delta real estate. Negotiations now are pending for the sale of the property to Eastern capitalists whose identity has not been disclosed. It is said to be the expectation that, in case the pending deal is consummated, that chemical works will be erected at some point not remote from the property and that an industrial enterprise of considerable magnitude will be established.

Nature of Deposit Only Recently Determined

It was not until last spring that any one paid particular attention to this deposit of strontianite. Early in the year, while Mr. Byron was prospecting around Millard County with an idea of determining the possibilities of oil production in that portion of the state, he was asked to inspect the reef comprising this deposit and, while he was unable to say just what it was without the aid of chemical analysis, he realized that the deposit was evidently of value and therefore went to the trouble of taking samples and having them tested and tried out by various assayers. Results were conflicting and it was not until quite recently, when he submitted samples of the ore to Prof. R. G. Bell, a member of the educational staff of the Delta high school. The material was quickly identified as strontium carbonate of high purity and the great value of the deposit was thus established.

This deposit, according to Mr. Byron, has formed a reef remote from any other rock formation in the section where it is located. This reef was formed by the action of a large hot alkaline spring. The spring is now extinct, but the crater in the middle of the reef is still intact and measures 265 feet in width with the rim standing thirty feet high around it. The enclosure thus formed has been used by cattlemen for many years as a corral in which to impound stock and it is known for miles around as the "rock corral."

Characteristics of Strontium

Native strontium carbonate, (SrCO_3) is an orthorhombic, pale green, white, gray or yellowish mineral, in masses of radiating needle-shaped or spear-shaped crystals, in fibrous massive forms, etc. Chemically it is described as a bivalent metallic element of the calcium group, always naturally combined, chiefly in strontianite (carbonate) and celestite (sulphate). It is isolated by electrolysis of the fused chloride, as a yellowish metal, similar to calcium, but harder. When pure it is silver white. Strontium compounds color the test flame carmine, and some, as the nitrate, are used in fireworks. The various salts obtained from the ore have many uses. There is a strontium process of refining sugar, etc.

Quoting from Mineral Resources of the United States, 1917, Part II, James M. Hill: "Domestic strontium ores were used by makers of strontium chemicals to a considerable extent during 1917. Prior to 1916 most of the salts made in this country were products of imported celestite. In 1917, however, the domestic deposits supplied over 70% of the domestic requirements. Detailed notes on the known occurrences of strontium ores in the United States were given in the report for 1916. Apparently few new commercial localities have been found, though extensions of the strontium area near Barstow, San Bernardino county, Calif., are reported. Difficulties of transportation continue to hinder the development of some deposits of celestite that appear to be of promise."

Production, Market and Prices

"From the best information available to the United States Geological Survey it would seem that approximately 4,035 short tons of strontium ore, valued at about \$87,700, of which about 10% was strontianite (strontium carbonate) and the remainder celestite (strontium sulphate), was mined in the United States during 1917. This ore was mined in California, Texas and Washington. By far the greatest production was made from California deposits. Approximately 1,700 tons of English celestite was imported in 1917 for use in this country."

"The principal market for celestite and strontianite is in the East, the largest buyers apparently being the Foote Mineral Co., of Philadelphia, Pa., and the E. I. du Pont de Nemours & Co., (Harrison works), of Philadelphia. There is a small market on the Pacific coast among makers of fireworks and carbonate. * * * Prices reported by sellers of celestite ranged from \$20 to \$22 a short ton, but for strontianite ores prices from \$35 to \$90 a short ton were reported. The Foote Mineral Co. on July 14, 1917, was selling ground celestite (90% SrSO_4) at 2c a pound (\$40 a ton) and ground strontianite (83% SrCO_3) at 7c a pound (\$140 a ton)."

New Mining Laws Revision Bill

In Its Presented Form Here Given

On January 23, 1917, the director of the bureau of mines, acting upon the recommendation of the Mining and Metallurgical Society of America, appointed the following committee of eminent engineers to draft a bill revising and codifying the mining laws of the United States: W. R. Ingalls, Walter Douglas, J. Parke Channing, J. R. Finlay, John Hayes Hammond, Hennen Jennings and L. D. Ricketts. Upon the death of Mr. Jennings, Horace V. Winchell was appointed to take his place. After exhaustive investigation, the committee completed its work and filed the proposed bill with H. Foster Bain, director of the bureau of mines, who has now made it public.

As the bill is one of highest importance to the mining industry, the Mining Review publishes it in full in order that it may be studied and discussed with the view to changing it if found desirable when the measure is under consideration by congress:

Proposed Mining Law

"A bill to revise, amend and codify the laws of the United States regulating the location of mining claims on the public domain and for other purposes.

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled: That this act may be cited by the short title of 'United States Mining Act.' Wherever the word 'person' occurs in this act it shall be construed to import the plural or singular as the case demands, and shall include individuals, associations, partnerships and corporations.

"Sec. 2. In all cases lands valuable for minerals shall be reserved from sale, except as otherwise expressly directed by law.

"Sec. 3. With the exceptions hereinafter noted, all valuable mineral deposits in lands belonging to the United States, both surveyed and unsurveyed, are hereby declared to be free and open to exploration and purchase, ownership and operation, and the lands in which they are found to occupation and purchase by citizens of the United States and those who have declared their intention to become such, under regulations prescribed by law. Provided, that this act shall not affect deposits of potassium, coal, phosphate, sodium, oil, oil shale, or gas; nor shall it pertain to withdrawals of public land which may have been, or may hereafter be, made; nor shall it apply to lands acquired under the act of March 1, 1911. (Thirty-six Statutes, page 961) known as the 'Weeks Law.'

"Sec. 4. Proof of citizenship, under this act, may consist, in the case of an individual, of his own affidavit thereof; in the case of an association of persons unincorporated, of the affidavit of their authorized agent, made on his own knowledge or upon information and belief; and in the case of a corporation organized under the laws of the United States, or of any state or territory thereof, by the filing of a certified copy of its charter or certificate of incorporation.

Form and Size of Claim—Requirement as to Discovery— Exploration of Land Classified as Non-Mineral.

"Sec. 5. A. Every full mining claim upon unsurveyed lands shall be located in the form of a square containing forty acres laid out on cardinal lines, conforming to the system of public land surveys, but claims may also be located in the form of a square containing ten acres laid

out on cardinal lines, conforming to the system of public land surveys. Other fractional claims shall be located in the same manner as full claims, but their area and form may be governed by available areas. When mining claims are located upon surveyed lands they shall conform to the subdivisions of the public land surveys. A full mining claim on surveyed lands shall be a quarter-quarter section or lot, but legal subdivisions of forty acres may be subdivided into ten-acre tracts. Other fractional claims on surveyed lands shall be located in the same manner as full claims, but their area and form may be governed by available areas.

"B. Subject to limitations contained in this article, discovery of valuable mineral shall not hereafter be necessary in order to locate and hold a mining claim, but when a claim is recorded in the United States land office, the records shall include a sworn statement as to whether or not a discovery has been made. A claim located and recorded without discovery on land classified as mineral may be held for five years without discovery, after which it shall be open to relocation under the same conditions as though it were a claim upon which the required expenditure for development had not been made; provided, however, that upon failure to make discovery within the period of five years a locator shall have the right to hold the claim or claims for further annual terms, not exceeding five years, by payment into the United States land office annually in advance fifty dollars for each acre or fraction thereof, which annual payments shall be in lieu of any further requirements for assessment work.

"C. Should the owner of a claim located without discovery of valuable mineral make such a discovery during such five-year period, or during such five-year extension thereof, as stipulated in article 3 of this section, he shall file a sworn statement as to that fact with the other papers in the United States land office, showing the nature of such discovery and of the mineral discovered. Upon the verification of such discovery by a United States deputy mineral surveyor, delegated by the officer in charge of said land office to make an examination, which examination shall bear the expense of the claimant, such discovery thus established shall entitle the owner of the claim to hold and possess it under the same conditions as though discovery had been made before the original record was filed in said land office.

If discovery of a valuable mineral be made by drilling more than 100 feet in depth, affidavits by at least two persons thoroughly acquainted with the facts, setting forth the nature of the discovery and the place, depth and time at which it was made shall be accepted by the United States deputy mineral surveyor, delegated by the officer in charge of said land office to make examination, as prima facie evidence of discovery, provided that such affidavits be made within 30 days following the discovery.

"D. Where no proceedings have been initiated in the United States land office to acquire a non-mineral estate in public land classified as non-mineral, mining claims may be located thereon with or without discovery, but in the absence of a discovery a subsequent location on such land shall not be recognized if made by the original locator, or by any person in privity with him, within two years after the prior location had become invalid.

"E. One discovery shall be sufficient to support the

holding and patenting of a maximum of four contiguous full claims, aggregating 160 acres (if held in common ownership), or 16 contiguous 10-acre claims, aggregating 160 acres, if held in common ownership.

"F. No person shall hereafter locate any mining claim or placer ground in Alaska as attorney for another unless he is duly authorized thereto by a power of attorney in writing, duly acknowledged and recorded in any recorder's office in the judicial division where the location is made. Any person so authorized may locate mining claims on placer ground for not more than two individuals or one association under such power of attorney, but no such agent or attorney shall be authorized or permitted to locate more than two mining claims on placer ground for any one principal month.

"No person shall hereafter locate, cause or procure to be located, for himself, in Alaska, more than two such claims, not to exceed 20 acres each in the case of an individual, or 40 acres if an association, in any calendar month; and no such claim in Alaska which is longer than three times its greatest width shall hereafter be patented. Any claim attempted to be located in violation of this article shall be null and void, and the whole area thereof may be located by any qualified locator as if no such prior attempt had been made.

"G. Final entry and payment shall be made for all mining claims located hereafter within seven years from the date of the original location, exclusive of the time consumed in adverse suits and contests; except that in the case of extensions obtained under the provisions of article B of this section the time limit for final entry and payment shall be 12 years from the date of the original location.

"H. In all cases of an application for a patent to mineral land a discovery shall be a condition precedent.

Marking, Notice and Recording of Locations—Annual Development Work.

"Sec. 6. A. The location of a claim must be distinctly marked on the ground so that its boundaries can be readily traced, and such marking shall include the placing of a permanent monument extending not less than two feet above the ground at each corner of the claim. At the time when the claim is monumented there shall also be posted in a conspicuous place on the claim a notice of location, which shall be according to a form prescribed by the United States surveyor general and in conformity with the terms of this act. All notices of location of mining claims hereafter made shall contain the name or names of the locators, the date of the location, and such a description of the claim or claims located by reference to some natural object or permanent monument as will identify the claim, and such notice of location of all claims, whether located before or after the effective date of this act, shall be recorded in the United States land office for the district in which located; the claims located after the effective date of this act shall be recorded within 90 days after the date of location; all claims located prior to the effective date of this act shall be recorded within one year after said date.

"B. On each claim located after effective date of this act, and until a patent has been issued therefor not less than \$5 worth of labor shall be performed or improvements made during each year for each acre or fraction thereof comprised in such claim; or in lieu of the performance of such labor a sum computed at the rate of \$5 for each acre or fraction thereof may be paid each year, including the year of location, into the United States land office for the district; on each claim located after the 10th day of May, 1872, and before the effective date of this act, and until a

patent has been issued therefor, not less than \$100 worth of labor shall be performed or improvements made during each year. On all claims located prior to the 10th day of May, 1872, \$10 worth of labor shall be performed or improvements made during each year for 100 feet in length along the claim until a patent has been issued therefor; but where such claims are contiguous, and are held in common, such expenditure may be made upon any one claim.

"C. Upon failure to comply with the conditions as to annual work or payments, as provided in article B of this section, the claim or mine upon which failure occurred shall be open to relocation in the same manner as if no location of the same had ever been made, provided that the original locator, or locators, or any person, or persons, in privity with him or them, shall be disqualified for a period of one year from making such relocation and a resumption of work shall not save the original locator, or locators, their heirs, assigns or legal representatives from the effects of such failure. Provided further, that a sale to an innocent purchaser for value after such failure and after such resumption shall cure such failure in the absence of a relocation prior to such sale.

"D. Upon the failure of any one of several co-owners to contribute his proportion of the expenditures required by the terms of article B of this section, the co-owners who have performed the labor or made the improvements, or who have paid the equivalent thereof to the United States land office as is required by article B of this section, may, at the expiration of the year, give such delinquent co-owners personal notice in writing by publication in the newspaper published nearest the claim for at least once a week for 13 consecutive weeks, and if at the expiration of 90 days after such notice in writing or by publication such delinquent should fail or refuse to contribute his proportion of the expenditure required by this section, his interest in the claim shall become the property of his co-owners who have made the required expenditures.

"E. The period during which the annual work is required to be done, as specified in this section, shall be the calendar year during which location of claim be made. Provided, that if it be impossible to finish the work begun during the calendar year of location, and if the work has been diligently and continuously prosecuted, completion of the work, by diligent and continuous prosecution thereof, in the ensuing calendar year shall hold the claim. Provided, however, that this permission may not be construed as a waiver of the performance of the obligatory assessment work during the second calendar year. Provided, further, that on claims located on placer ground in the territory of Alaska said annual work shall be done during the calendar year in which they are located, and regardless of the time of year in which location may have been made.

Extralateral Rights and Ownership in All Minerals and Surface Embraced Within the Claim.

"Sec. 7. Subject to the extralateral rights of mining claimants or patentees, the holder or patentee of a mining claim located hereafter shall have the exclusive right of possession and enjoyment of the surface held by him and of the minerals covered by this act which lie beneath the claim and within vertical planes passing through the surface boundaries of said land, but shall not have the right to follow any mineral deposit beyond said planes. And the holders or patentees of claims heretofore located shall have similar exclusive possession of all the minerals covered by this act which lie beneath the claim and within vertical planes passing through the surface boundaries of

said land that is not covered by any existing extralateral rights.

Proceedings in Obtaining Patent.

"Sec. 8. A. A patent for any land claimed and located for valuable deposits may be obtained in the following manner: Any person, association, or corporation authorized to locate a claim under this act, having claimed and located a piece of land for such purposes, and having complied with the terms of this act, may file in the proper district land office an application for a patent, under oath, showing such compliance, together with proof of a discovery of valuable mineral, together with a plat and field notes of the claim or claims in common, made by or under the direction of the United States surveyor general, showing accurately the boundaries of the claim or claims, which shall be distinctly marked by monuments on the ground.

"The claimant shall post a copy of such plat, together with a notice of such application for a patent, in a conspicuous place on the land embraced in such application previous to the filing of the application for a patent, and shall file an affidavit of at least two persons that such notice has been duly posted, and shall file a copy of the notice in such land office.

"B. Upon compliance with the terms of article A of this section the claimant shall be entitled to a patent for the land, in the manner following: The register of the district land office, upon the filing of such application, plat, field notes, notices and affidavits, shall, for the period of 60 days, publish a notice, that such application has been made, in a newspaper to be by him designated as published nearest to such claim; and he shall also post such notice in his office for the same period.

"The claimant at the time of filing this application, or at any time thereafter, within the 60 days of publication, shall file with the register a certificate of the United States surveyor general that \$20 worth of labor has been expended or improvements made upon the claim by himself or grantors for each acre of the claim; or that cash has been paid into the United States land office to an amount bringing the total expenditure up to \$20 for each acre of the claim; and that the plat is correct, together with such further description by such reference to natural objects or permanent monuments as shall identify the claim; and shall furnish an accurate description to be incorporated in the patent.

"At the expiration of the 60 days of publication the claimant shall file his affidavit showing that the plat and notice have been posted in a conspicuous place on the claim during such period of publication.

"If no adverse claim shall have been filed with the register and the receiver of the proper land office, at the expiration of the 60 days of publication, it shall be assumed that the applicant is entitled to a patent, upon the payment to the proper officer of \$5 per acre, and that no adverse claim exists; and thereafter no objection from third parties to the issuance of a patent shall be heard, except if it be shown that the applicant has failed to comply with the terms of this act.

"Provided, however, that in the District of Alaska adverse claims authorized and provided for in this and the following section may be filed at any time during the 60 days period of publication or within eight months thereafter, and the adverse suits authorized and provided for in the following section may be instituted at any time within 60 days after the filing of said claims in the local land office.

"Provided, further, that where the claimant for a patent is not a resident of or within the land district where-

in the vein, lode, ledge or deposit sought to be patented is located, the application for patent and the affidavits required to be made in this section by the claimant for such patent is not a resident of or within the land district where where said agent is conversant with the facts sought to be established by said affidavit.

Adverse Claims Against Applications for Patent.

"Sec. 9. A. Where an adverse claim is filed during the period of publication, it shall be upon oath of the person or persons making the same, and shall show the nature, boundaries and extent of such adverse claim, and all proceedings, except the publication of notice and making and filing of the affidavit thereof, shall be stayed until the controversy shall have been settled or decided by a court of competent jurisdiction, or the adverse claim has been waived.

"It shall be the duty of the adverse claimant, within 30 days after filing his claim, to commence proceedings in a court of competent jurisdiction, to determine the question of the right of possession and prosecute the same with reasonable diligence to final judgment; and a failure to do so shall be a waiver of his adverse claim.

"After such judgment shall have been rendered, the party entitled to the possession of the claim, or any portion, thereof, may, without giving further notice, file a certified copy of the judgment roll with the register of the land office, together with the certificate of the surveyor general that the requisite amount of cash or labor has been expended or improvements made thereon, and the description required in other cases, and shall pay to the receiver \$5 per acre for his claim, together with the proper fees, whereupon the whole proceedings and the judgment roll shall be certified by the register to the commissioner of the general land office, and a patent shall issue thereon for the claim or such portion thereof as the applicant shall appear, from the decision of the court rightfully to possess.

"B. If it appears from the decision of the court that several parties are entitled to separate and different portions of the claim, each party may pay for his portion of the claim with the proper fees, and file the certificate and description by the surveyor general, whereupon the register shall certify the proceedings and judgment roll to the commissioner of the general land office, as in the preceding case, and patents shall issue to the several parties according to their respective rights.

"C. Nothing contained in this section shall be construed to prevent the alienation of a title conveyed by a patent for a mining claim to any person whatever. If, in any action brought pursuant to this section, title to the ground in controversy shall not be established by either party, the jury shall so find, and the judgment shall be entered according to the verdict. In such case costs shall not be allowed to either party, and the claimant shall not proceed in the land office or be entitled to a patent to the ground in controversy until he shall have perfected his title. The adverse claims referred to in this section may be verified by the oath of any duly authorized agent or attorney in fact of the adverse claimant cognizant of the facts stated.

Description of Claims.

"Sec. 10. The description of mining claims upon surveyed lands shall designate the location of the claims with reference to the lines of the public survey. Where such claims are upon surveyed lands and conform to legal subdivisions no further survey or plat shall be required. Where patents have been or shall be issued for claims upon

unsurveyed lands, the public survey shall adjust the same to the boundaries of said patented claims so as in no case to interfere with or change the true location of such claims as they are officially established upon the ground.

"Where patents have been issued for mineral lands, those lands only shall be segregated and shall be deemed to be patented which are bounded by the lines actually marked, defined, and established upon the ground by the monuments of the official survey upon which the patent grant is based, and surveyors general in executing subsequent patent surveys, whether upon surveyed or unsurveyed lands, shall be governed accordingly. The said monuments shall at all times constitute the mightiest authority as to what land is patented, and in case of any conflict between the said monuments of such patented claims and the descriptions of said claims in the patents issued therefore the monuments on the ground shall govern, and erroneous or inconsistent description or calls in the patent descriptions shall give way thereto. Where by the segregation of mineral lands in any legal subdivision a quantity of agricultural land less than 40 acres remains, such fractional portion of agricultural land may be entered by any party qualified by law, for homestead or preemption purposes.

Surveys.

"Sec. 11. The surveyor general of the United States may appoint in each land district containing mineral lands as many competent deputy surveyors as shall apply for appointment to survey mineral claims. The expenses of the survey of mining claims, together with the cost of publication of notices shall be paid by the applicants, and they shall be at liberty to obtain the same at the most reasonable rates, and they shall also be at liberty to employ any United States deputy surveyor to make the survey.

"The commissioner of the general land office shall also have power to establish the maximum charges for surveys and publication of notices under this act; and, in case of excessive charges for publication, he may designate any newspaper published in a land district where mines are situated for the publication of mining notices in such district, and fix the rates to be charged by such paper; and to the end that the commissioner may be fully informed on the subject, each applicant shall file with the register a sworn statement of all charges and fees paid by such applicant for publication and surveys, together with all fees and money paid the receiver and the receiver of the land office, which statement shall be transmitted, with the other papers in the case, to the commissioner of the general land office.

Verification of Affidavits—Notice of Contest.

"Sec. 12. All affidavits required to be made under this act may be verified before any officer authorized to administer oaths. All testimony and proofs may be taken before any officer authorized to administer oaths. All testimony before any officer authorized to administer oaths within the land district where the claims may be situated, and, when duly certified by the officer taking the same, shall have the same force and effect as if taken before the register and receiver of the land office.

"In cases of contest as to the mineral or agricultural character of the land, the testimony and proofs may be taken as herein provided on personal notice of at least 10 days to the opposing party; or if such party can not be found, then by publication of at least once a week for four consecutive weeks in a newspaper, to be designated by the register of the land office as published nearest to the loca-

tion of such land; and the register shall require proof that such notice has been given.

Land Required for Mining Purposes Other Than in Mineral Claims.

"Sec. 13. A. Where unoccupied land belonging to the public domain, not contiguous to a mining claim, is required by the proprietor of such claim for milling or metallurgical purposes, such non-adjacent land may be located and may be embraced and included in an application for a patent for such claim, and the same may be patented therewith, subject to the same preliminary requirements as to survey and notice as are applicable to mining claims; but no location hereafter made of such non-adjacent land shall exceed 10 acres, and payment for the same must be made at the same rate as fixed by this act for a mining claim.

"The ten acres of non-adjacent land provided for in this section must be in the form of a square, two sides of which must coincide with lines of the public survey. The owner of a mill, or reduction works, now owning a mine in connection therewith, may also receive a patent for his mill site or works sites as provided in this section.

"B. Where unoccupied land belonging to the public domain, either contiguous or non-contiguous to a mining claim, is needful in large area for milling and metallurgical purposes the surface rights of such land may be acquired in parcels or lots, conforming to the lines of the public surveys, without limit as to aggregate area, providing the application has been approved by the secretary of the interior.

"Land thus located and acquired under the provisions of this article shall be subject to the same provisions as to survey and notice as are required for the location and purchase of mineral lands in this statute; provided, however, that no land that has been officially classified by the federal government as being capable of irrigation from any known source may be located under the terms of this article. Lands located under the article shall be paid for at the rate of \$10 per acre.

"C. The tenure of the surface provided for in article B of this section refers solely to the occupancy of the surface, and the mineral rights underlying land thus acquired shall be in all cases reserved and shall be subject to location and patent under regulations and provisions promulgated by the secretary of the interior in harmony with the general provisions of this act governing the location of mineral lands.

Mineral Development Funds.

"Sec. 14. All moneys paid into the United States land office in lieu of annual labor or improvements and for extension of tenure beyond five years where no discovery has been made, as provided for in this act, are hereby reserved, set aside, and appropriated, as a special fund in the treasury, to be known as the 'Mineral Development Fund,' to be used and expended under the direction of the secretary of the interior, within the state or territory and as nearly as practicable within the mining district from which payments were made, for general purposes of developing the mineral resources of the several mining districts.

Special Provisions.

"Sec. 15. Whenever, by priority of possession, rights to the use of water for mining, agricultural, manufacturing, or other purposes, have vested and accrued, and the same are recognized and acknowledged by the local customs, laws and the decisions of courts, the possessors and owners of such vested rights shall be maintained and protected in the same; and the right of way for the construction of ditches and canals for the purposes herein specified is acknowledged and confirmed; but whenever any person,

in the construction of any ditch or canal, injures or damages the possession of any settler on the public domain, the party committing such injury or damage shall be liable to the party injured for such injury or damage.

"Sec. 16. All patents granted, or preemption or homesteads allowed, shall be subject to any vested and accrued water rights, or rights to ditches, and reservoirs used in connection with such water rights, as may have been acquired under or recognized by the preceding section.

"Sec. 17. The president is authorized to establish land districts, and to appoint the necessary officers under existing laws, wherever he may deem the same necessary for the public convenience in executing the provisions of this act.

"Sec. 18. Subject only to such general limitations as may be necessary to exempt navigation from artificial obstructions, all land and shoal water between low and mean high tide on the shores, bays and inlets of Bering sea, within the jurisdiction of the United States, shall be subject to exploration and mining for gold and other precious metals by citizens of the United States, or persons who have legally declared their intentions to become such, under such reasonable rules and regulations as the miners in organized mining districts may have heretofore made or may hereafter make governing the temporary possession thereof for exploration and mining purposes.

"Provided: That the rules and regulations established by the miners shall not be in conflict with the mining laws of the United States; and no exclusive permits shall be granted by the secretary of war authorizing any person or persons, corporation or company to excavate or mine under any of said waters below low tide; but citizens of the United States or persons who have legally declared their intention to become such shall have the right to dredge and mine for gold or other precious metals in said waters, below low tide, subject to such general rules and regulations as the secretary of war may prescribe for the preservation of order and the protection of the interests of commerce; such rules and regulations shall not, however, deprive miners on the beach of the right hereby given to dump tailings or pump from the sea opposite their claims, except where such dumping would actually obstruct navigation; and the reservation of a roadway 60 feet wide, under the 10th section of the act of May 14, 1898, entitled 'An act extending the homestead laws and providing for right of way for railroads in the District of Alaska, and for other purposes,' shall not apply to mineral lands or town sites.

"Sec. 19. No act passed at the first session of the thirty-eight congress granting lands to states or corporations to aid in the construction of roads or for other purposes, or to extend the time of grants made prior to the 30th day of January, 1865, shall be so construed as to embrace mineral lands, which in all cases are reserved exclusively to the United States, unless otherwise specially provided in the act or acts making the grant.

"Sec. 20. No possessory action between persons, in any court of the United States, for the recovery of any mining title, or for damages to any such title, shall be affected by the fact that the paramount title to the land in which such mines lie is in the United States; but each case shall be adjudged by the law of possession.

"Sec. 21. The secretary of the treasury is hereby authorized and directed to pay, out of the moneys heretofore or hereafter covered into the treasury from deposits made by individuals to cover cost of work performed and to be performed in the office of the United States surveyors general in connection with the survey of mineral lands, any excess in the amount deposited over and above the actual

cost of the work performed, including all expenses incident thereto for which the deposits were severally made or the whole of any unused deposit; and such sums, as the several cases may be, shall be deemed to be for that purpose. Such repayments shall be made to the person or persons who made the several deposits, or to his or their legal representatives, after the completion or abandonment of the work for which the deposits were made, and upon an account certified by the surveyor general of the district in which the mineral land surveyed, or sought to be surveyed, is situated and approved by the commissioner of the general land office.

"Sec. 22. Whereby special act of congress land has been opened to exploitation under the mineral land laws of the United States but subject to any special limitation or condition expressed in such special act, this act shall not be construed as waiving such limitation or condition.

"Sec. 23. So much of the act of August 4, 1892 (37 statutes at large, page 348) as provides for the entry of lands chiefly valuable for building stone under the provisions of the law relating to placer mining claims is hereby amended by striking out the word 'placer' and hereafter this act shall be substituted for the placer mining law in the making of such entries.

"Sec. 24. The provisions of this act shall not apply to public lands in the states of Michigan, Wisconsin, Minnesota, Missouri, Kansas or Alabama.

Repealing Section.

"Sec. 25. The following sections of the Revised Statutes, that is, Section 2320, relating to the size of lode claims; section 2322, relating to the rights in mining claims; section 2323, relating to rights initiated prior to May 10, 1872; section 2329, providing for the location of placer claims; section 2330, relating to placer claims; section 2331, relating to the survey and segregation of mineral lands; section 2332, relating to claims held for a statutory period and to liens on claims; section 2333, relating to the patenting of placer claims; section 2336, relating to intersecting veins; section 2338, relating to state rules for working mines; section 2341, relating to preemption and homestead entries of lands designated as mineral lands; section 2342, relating to the designation of agricultural lands; and section 2344, relating to rights acquired under prior existing law; also the act of congress approved June 6, 1874 (18 statutes at large, page 61) relating to expenditures of labor and improvements on mining claims; and the act of congress approved February 11, 1875 (18 statutes at large, page 315) relating to tunnel work, are hereby repealed: Provided, that nothing contained in this act, except as expressly provided, shall be construed to affect any right heretofore initiated."

DIAMOND DRILL PROSPECTING BRINGS RESULTS

Advices from Frank A. Kennedy, who is managing operations at the Red Ledge properties in the Seven Devils district, Idaho, indicate that most substantial results are being obtained from the diamond drilling campaign that is now under way for the present season. Mr. Kennedy says:

"We have just completed our first drill hole this season on the Red Ledge properties on Snake river, in the Seven Devils, and got 120 feet of commercial silver-copper ore in a 390-foot hole. We have completed nearly 5,000 feet of diamond drilling to date and have shown up four wide ore zones, running 46 feet, 70 feet, 118 feet and 60 feet in width. The last named averaged 7.5 per cent copper, 2 oz. silver and \$4 in gold."

PADDY PRIDE DEVELOPMENT INSURES NEW MINE IN NEVADA

Goldfield Nev., July 22.—The famous Shoshone field, 165 miles south of Goldfield and home of the Tecopa Consolidated and other noted silver-lead producers, boasts a new shipper in the Paddy Pride group of five claims, owned by the Paddy Pride Silver Mining Co. Upward of \$340,000 in shipping ore is reported demonstrated by the management, with the shipping product accompanied by a large body of medium-grade ore carrying silver, lead and gold. The ore body shows a uniform width of eight feet, with two feet averaging \$100 per ton.

The vein has been developed for 80 feet in tunnel No. 2, which intersected the ledge about 170 feet below No. 1 tunnel on its rake. The winze from No. 2 tunnel is in ore showing a width of eight feet, with all indications favoring persistence of the massive vein to great depth beyond the present workings. Arrangements are being made by the management to connect the two tunnels, and to drive a crosscut from No. 2 tunnel at a point 90 feet in from the portal. The crosscut is figured to develop the ore body for an additional 100 feet.



Paddy Pride Mine, Shoshone, showing outcrop of ledge

Following this work sinking of the winze is to be resumed and heavy shipments made to Salt Lake smelters. The management estimates enough shipping ore already demonstrated to insure net profits of \$170,000, without considering the values carried by the concentrating product. Later on concentration facilities are to be provided.

The Paddy Pride mine is located 18 miles west of the world-famous Tecopa Consolidated, controlled by wealthy Philadelphia men, and in the same lime formation. An excellent road extends from the Paddy Pride to Zabriskie, the nearest railroad point on the Tonopah & Tidewater railway, a distance of nine miles. E. Marks, of Tonopah, is president; Patrick Miles, Shoshone, Cal., vice-president, and John T. Overbury, of Goldfield, secretary. Mr. Overbury was the first president of the Tecopa Consolidated, which has been developed to a depth of 1,000 feet and continues to yield substantial dividends after many years of profitable production.

Goldfield Activities

The shaft of the Gold Hill mine, owned by the Goldfield Development Co., has attained a depth of 215 feet and crosscutting from the 200 level has advanced over 30 feet. Within 20 to 40 feet the management expects to intersect the huge orebody which ranges from 14 to 70 feet wide in the upper workings and averages \$10 in gold per ton. As soon as the vein is encountered sinking of the shaft to water level will be resumed.

The three-compartment shaft of the Goldfield Deep Mines Co. has gained a depth of 600 feet and is being driven by three shifts. With the reaching of the 800 level the 250-horsepower Merger hoist will be operated in conjunction with the 75-horsepower engine now employed. At a depth of 1,000 feet the shaft is expected to intersect the C. O. D., Gold Bar and Victor veins, and the Florence-Goldfield Consolidated ore-channel at a depth of 2,400 feet.

High-grade ore has been uncovered by the Donald-Giles lease on the Florence, and several rich strikes are reported by lessees working on the Goldfield Consolidated. The Crackerjack Co. continues to open shipping and milling ore. Several companies are ready to start shipments to plants at Tonopah and Millers as soon as these plants are free from the influence of the Tonopah strike.

The Yellow Tiger Co., in which Denver, Salt Lake, New York, California and other people are interested, has completed arrangements for resumption of work at the Sterlag properties, in the Stonewall district. Driving of the tunnel is to be rushed with a fell crew, and General Manager Gordon H. Bettles is confident extensions of the big veins exposed in the old workings will be cut by the tunnel within a comparatively short time.

WYOMING OIL ASPECT HOPEFUL

Casper, Wyo., July 18.—The Northwest is feeling the effects of oil over-production, but general opinion is that there will be a decided turn for the better by fall.

Standard Oil Company of Indiana and Midwest Refining company will lay off approximately 1,500 men in July. This will mark completion of the program of enlargement of the past twelve months.

Salt Creek field is now held down to a daily run of 25,000 barrels, while its average in times of ordinary production will be close to 60,000. Smaller firms claim that at 50 cents a barrel the present price for Salt Creek and Big Muddy crude, they cannot pay expenses, and expect to shut down unless the market looks up.

Late operations have had a tendency to show great possibilities in the future. The Midwest, drilling in central part of Salt Creek field, struck a flow of oil in the Dakota sand under the Wall Creek. This means that the first test well drilled below the horizon that has been producing the oil from Salt Creek field to date has discovered another oil bearing stratum that appears even greater than the present Wall Creek sand.

The Shannon pool, the first oil found in the Salt Creek field, was only about a half mile in area, the wells were about 400 feet deep and produced about five barrels each a day. Oilmen then discovered the first Wall Creek sand, about 900 feet below the surface in the center of the field, the wells making 100 barrels a day. Later the geologists claimed there was still another pay sand further down and eventually operators drilled to the second Wall Creek sand, which resulted in a number of wells that produced as high as 20,000 barrels a day.

Geologists kept up their cry of deeper oil, and Midwest at last drilled the test that came in last week. The Shannon pool was about a single section in size. The first Wall Creek sand enlarges this to about fifteen square miles, the second Wall Creek sand area covers about fifty square miles, while the new strikes, according to geologists, is to spread out until the field will cover 146 square miles.

• Elk Basin and Grass Creek fields have also been tested below present producing sands and found to be petroleum bearing.

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THE SEARCH FOR NEW MINES IS ON

With steadily increasing frequency reports are coming in that capital is again turning its attention to the metal mining districts of the Western States. It also is noticeable that the search for properties in which to make investments is along altogether new lines. In the years gone by the average investor of means was usually insistent that his engineer or engineers should not bother with propositions that lacked measurable tonnages of commercially profitable ore. Under the new order of things that insistence no longer prevails to an appreciable extent.

The movement now beginning to manifest itself calls for a complete reversal of established mining engineering practice, as exemplified in the past work of engineers of so-called exploration companies and "exploration departments" of large mining and smelting corporations. The fact has come to be appreciated that if there is to be a revival of metal mining, new mines must be found and developed and reliance must be placed on mining engineers and mining geologists with sufficient "courage of conviction" to advise the development of propositions which their judgment tells them warrant the expenditure of capital to open them up. The services of such engineers are now being sought and, fortunately for those who may be hunting worthy propositions, there are a sufficient number of

idle men in the engineering profession right now—men who are familiar with conditions in the metal mining regions of the West—to meet the demand.

The investing and the speculative public have grown weary of the schemes of the wildcatter and the "tin-horn" promoter and his stock-jobbing tactics. Stocks in the heavily capitalized and big yielding mining corporations and kindred concerns are no longer attractive in the stock markets of the country, while the "little fellows" have become disgusted with the "hog-it-all" tactics and manipulations of the degenerate, unscrupulous and dishonest element in the ranks of the mining brokerage fraternity the country over.

As a result of these conditions, and the knowledge that the day is at hand when there will be an unequaled demand for the precious and semi-precious metals, as well as for lead, copper and zinc, the search for new mines has commenced. Capital now is willing to take hold of likely, promising prospects and small mines and develop them.

There now is room and a place for the mining engineer or mining geologist to "cash in" on the knowledge he has gained in the field by selling his knowledge and ability to men who may trust him to not only make reliable reports, but who is willing to give an unbiased opinion, backed by recommendation, as to what should be done when properties are taken over with the object of making commercial propositions of them. This is not intended as a reflection on past practice and methods of making reports by the engineering profession; it is offered as a pointer on what changed conditions demand. New mines must be made, and money is becoming available to make them. The mining engineer and mining geologist of discernment and courage to express himself is going to prove an important factor in the new order of things.

ASSESSMENT WORK—RELOCATING

Answering a number of inquiries on the subject from various mining districts and individuals, the Mining Review offers the following explanation and a copy of the law itself.

The resolution passed by congress and signed by President Wilson on December 31st, 1920, extended the time for doing 1920 annual assessment work "to and including July 1st, 1921," so that ground subject to forfeiture as a result of not doing the work by midnight July 1st, could not be legally re-located or "jumped" before July 2nd. Copies of that law received here from Washington, carry the word "including" as quoted above.

Evidently the intent was to grant the claim-owner an additional six months in which to do his 1920 work; but the wording of the law as promulgated and signed, reading as quoted above, tacked on an additional day.

It is the unqualified opinion of good lawyers here in Salt Lake that re-locations made on July 1st, if contested, would be declared unlawful and of no effect, and they are advising clients who may have re-located or jumped ground on the first of July, to make themselves safe by doing the work over again and making new filings with the district or county recorder, as the case may be.

Following is a copy of the resolution as passed by congress and approved on the last day of the year 1920:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled: That the period within which work may be performed or improvements made for the year 1920, upon mining claims as required under section 2324 of the Revised Statutes of the United States, is hereby extended to and including the first day of July, 1921; so that work done or improvements made upon any mining claim in the United States or Alaska on or before July 1, 1921, shall have the same effect as if the same had been performed within the calendar year of 1920: Provided, That this Act shall not in any way change or modify the requirements of existing law as to work to be done or improvements made upon mining claims for the year 1921.

Approved December 31, 1920.

HALF MILLION TO BE SPENT

ON A NEW UTAH COAL MINE

Culbert L. Olson of Los Angeles and Emmett K. Olson of Price, according to the News-Advocate of Price, Carbon county, have secured a coal lease from the government on 840 acres of land in Price canyon just north of Cameron. It is part of the leasing unit recently bid on by the Cameron Coal Company when the same was auctioned by the register of the Salt Lake City land office, pursuant to the application of the Cameron Coal Company. At this auction the Cameron Coal Company on behalf of itself and the Olsons bid for and secured the lease, an agreement or stipulation having previously been entered into between the parties, and this stipulation filed with the bid, setting forth the acreage which should be granted to the Cameron people and the acreage which should be granted to the Olsons.

The Olson lease begins at Castle Gate rock, extending northward along and on each side of Price canyon. Word was received by E. K. Olson by wire that the lease had been granted and signed by the proper officials of the department of the interior. The terms of the lease are that the lessees shall pay as a royalty to the government 10 cents per ton for each ton of coal mined. The lease runs forever, subject to compliance on the part of the lessees with the terms of the lease. An immediate expenditure of \$50,000 is one of the requirements.

This land has never been opened to entry for coal purposes since the government surveys were extended to cover it, although it has long been recognized by coal operators as valuable coal land. In 1913 the Olsons first made application to the government to have this land appraised and opened to entry. When the new coal and oil leasing bill went into effect, however, this land was automatically thrown open and made subject to lease. On the day that this leasing bill was signed, E. K. Olson filed an application for this land for the prospecting permit under the terms of the bill, which would have given him the right to lease the land in case he uncovered workable beds of coal.

The Cameron Coal Company then filed an application covering this same land as well as other adjoining land to have a leasing unit created, contending that this land was in a developed area and that it was known to contain workable beds of coal and that it therefore did not require prospecting. The geological survey sustained this contention and a leasing unit was created. Under the law, it was offered at public auction and given to the highest bidder. Thus it was with the stipulations filed as above, that the two leases were granted.

The lease is being financed by Culbert L. Olson among California capitalists. It is the intention to sink a three-compartment vertical shaft to a depth of 800 feet along Price canyon and near the center of the lease to the beds of coal, which underlie this entire tract of land, and thus open up the mine. Self dumping cages operated by electric power will be installed to hoist the coal and land it directly onto the tipples.

Modern machinery and equipment of latest and most efficient design will be installed with the intention of making a heavy producer of the mine. Opening up this mine will bring considerable money to Carbon county. The estimated cost of construction of shafts, railroad-spurs and yards, tipples, machine shops, houses and equipment will be approximately \$500,000.

TINTIC STANDARD'S QUARTERLY REPORT

Tintic Standard Mining company earned \$4.60 per ton of ore shipped, before allowance for taxes and depreciation, during the first quarter of 1921 according to report just submitted to stockholders. Gross value per ton of ore shipped was \$33.07 which with miscellaneous income of 15 cents a ton made value per ton \$33.22. Smelter deductions and treatment charges were \$14.41 per ton; freight charges \$4.19 a ton; productive cost and development \$1.02 a ton.

The report states that the company's new mill has been brought to capacity and is treating ores with a head of 15 ounces of silver, making a recovery of 81.2 per cent of the silver content or 11.36 ounces per ton. No mill costs are stated. The report follows:

"Below we submit the balance sheet of our company and a brief report on the development and improvements made during first three months of 1921.

Underground work from Jan. 1 to March 30, 1921—winzes, 25 feet; raises, 419 feet; drifting, 1,551 feet; square set stoping, 1,226 sets.

"For the first quarter of 1921 we shipped 24,566 dry tons with a gross assay content of \$812,577.02. Miscellaneous income \$3,642.28. Smelter deductions and treatment charges, \$354,019.04; freight charges, \$102,879.34; productive cost and development, \$246,141.66; leaving net to your company, \$113,179.26.

"A new 6 room brick assay office and laboratory was erected and two large new ventilating fans were installed on the 1200 and 1450 foot levels, respectively, and the foundation for the new large air compressor was completed.

"We wish to call the attention of the stockholders to the splendid success of our new acid-brine chloridizing and leaching mill which was started up last February, and by the latter part of April had been gradually brought up to capacity. Since May 1, it has been and is now, treating 140 tons of mill ore daily, the average assay value per ton of which is 14 ounces silver; .015 gold; 3½ per cent lead and 15 copper.

"The predominating value of our milling ore being silver, the mill was designed and constructed for the purpose of extracting and saving the highest possible percentage of the silver content in the ore, and we are pleased to report that during May and June, the silver extraction has been 81.2 per cent."

Balance sheet, as of March 30, 1921:

Assets—Mining claims, \$1,203,087.44; millsite and water rights, \$31,058.53; buildings and machinery \$560,290.62; small tools and other equipment, \$38,738.22; mine supplies and timbers, \$9,572.15; capital deferred charges, \$1,113.50. Accounts receivable: Goshen Valley R. R. Co., \$342,720.45; sundry accounts, \$113,647.29.

Current Assets—Deposit premium, \$750.00; prepaid insurance, \$2,896.60; leasehold, \$1,853.65; patent deposits \$825.65; stock of other companies, \$87,884.04; bank balance, \$32,448.57; U. S. government bonds, \$65,000.00; war savings stamps, \$834.00. Total assets, \$2,492,720.71.

Liabilities—Capital stock \$1,175,000.00; less treasury stock, \$300.00; accounts payable, \$61,954.54; earned surplus as of Jan. 1, 1921, \$1,201,630.91; first quarter, 1921, net, \$54,444.26. Total liabilities, \$2,492,720.71.

BLACK METALS TO RESUME

A resumption of operations is being planned by the management of the Black Metals Mining Company, owning property situated near Pioche, Nev., according to information received at the company's offices. This step will be taken because the management and the board of directors feel that, with present reduced mining costs, oper-

ations can be carried on at a profit. As the greater part of the value of the Black Metals ore is due to its silver content, the management is anxious to produce while a high price for the white metal, under the provisions of the Pittman act, is ensured.

Labor at Pioche, according to E. H. Snyder, a director is 25 per cent cheaper than it formerly was and 25 per cent more efficient. Cost of fuel oil has been lowered 40 per cent, and mine supplies, 20 per cent, he says. Now that the cause of the mine's shutdown, high cost of operation, has been removed, the management and a majority of stockholders are anxious that production should be resumed.

CLASS "K" OKELL RIG AT FALLON

By A. J. Moore.

Fallon, Nevada, July 21.—It will be recalled that several weeks ago there was published in these columns an article on the Syndicate Oil Company, its officers, land holdings and partial description of the Class "K" Okell rig which they were about to purchase. As this rig has arrived and has been assembled and as this company is by all odds the strongest one financially in the field a somewhat detailed description of the rig will be interesting to oil men generally whether operating in the Fallon or other fields.

A few weeks ago J. H. Miller, president of the company went to Los Angeles for the purpose of selecting a drilling crew and a drill. After much investigation he selected a class "K" Okell. The geologists have ever claimed that the Fallon field is a replica of the Coalinga and other California fields and as the Okell rig has proven a marked success there, the Shell company alone using seventeen such rigs, one was purchased. It arrived at Fallon in just three and one half days from the date of shipment from Los Angeles.

Meantime Secretary Noteware at Fallon had been busy superintending the building of the 84-foot derrick. This height will allow of the swinging of three lengths of casing and a string of tools at the same time. It will be electric lighted, the electricity being supplied from the electric machine attachment of the drilling machine.

The class "K" Okell is a combination rig which makes it particularly well adapted to drilling in the Fallon field. Here some strata are very hard others quite easy drilling. For the latter a fish-tail bit is used and very rapid drilling results, and when the hard stratum is hit then a core drill takes its place. By the latter the core is withdrawn and the character of the formation and its pitch is noted. That bug-a-boo of a Standard rig—a boulder—has no terror for an Okell of this size. The motive power is furnished by two 22 H. P. engines working on a universal joint, by which arrangement either engine may run one unit should the other break down, or they may be combined and furnish a 44 H. P. The cast steel hoisting drum may be run under three speeds. This greatly facilitates hoisting as in the case of lifting a long string of casing or tools requiring much power and safe speed or in case of a light load more speed and in sending traveling blocks to the derrick head where speed is the desired qualification, etc. The rig is so equipped that the two pumps, sometimes known as "mudslingers" may be both in use at the same time or only one, or they can be shut off altogether without interfering with the running of the engines.

The class "K" Okell is designed to drill 3,500 to 5,000 feet, and is rated as the most efficient combination drill manufactured. The advantage of a combination rig, particularly in the Fallon field, is self evident. The rig as it landed at the Fallon depot filled two cars and then there are some tools and parts that will make up a third shipment. Two high class drillers have been secured, both of whom have had much experience in drilling with Okells in California fields.

NEW COAL AND OIL COMPANY

Plans for the development of coal and oil holdings of the Conqueror Oil Company in Parowan valley, about seven miles from Parowan, Iron county, Utah, are being made by Henry F. Crittenden, president and manager. Recently the company acquired 2000 acres of oil land and 1000 acres of coal land.

Two geologists, Christon Vrang and A. G. Burritt, have gone over the Parowan structure, according to Mr. Crittenden and give it as their opinion that oil will be found at a depth of 1500 to 1800 feet. Mr. Crittenden has succeeded in interesting Oklahoma oil interests who, it is said, are planning to send their geologists into the field for the next few weeks. If the structure is indorsed by these geologists the Oklahoma men will begin drilling in the near future, Mr. Crittenden says.

The coal lands of the Conqueror company have been developed by two 500-foot adits. Six veins, from a few inches to a foot and a half wide, have been opened up. The lower tunnel, according to Mr. Crittenden, has been driven along the bedding plane of the sandstone on one of the smaller veins. The upper tunnel crosscuts the formation. The last vein was cut at a vertical depth of 150 feet, and is the most promising it is said. For the whole of the width of eighteen inches the coal is clean and even in grade. An average sample taken of the vein analyzed, according to Mr. Crittenden, 2.66 per cent moisture, 30.30 percent volatile matter; fixed carbon, 52.22 per cent, and ash, 14.82 per cent.

Since coal sells for a good price in the southern part of the state, it is Mr. Crittenden's opinion that this vein can be profitably developed. Near Saratoga, Wyo., it is said, a vein of coal of similar grade and of approximately the same size has been profitably worked for years.

WILL TRY PROSPECTING AGAIN

C. C. Higgins of Reno has sold his placer claims in Rochester canyon and returned to Reno, from where he will equip the flivver and go on a prospecting trip. Higgins located the placer claims five years ago to get possession of tailings from the mill of the Rochester Mines Company's mill. At intervals he flooded the pond and later, after the sun and air had brought the unrecovered values to the top, he swept the surface. It has been a profitable industry except when occasional heavy rains carried the treasure off before harvest time. Higgins is noted as one of the best of the old school prospectors and is returning to the game now that Congress has let nature take its course and many mining claims that have been held on old locations have become open to location.—Nevada Mining Press.

OLD SHEBA MINE BEING REOPENED

The old Sheba mine, which was a producer in the early days of Nevada's mining life, is being operated again by S. H. Brady and associates, and, according to Mr. Brady, who returned to Reno a few days ago, the showing on the property is very good. The mine is located near Imlay.

"I have cut the old Sheba vein to the north of the fault that stopped the old timers," said Brady, "and have the same vein, and the same ore in a tunnel that is into the mountain 1,460 feet with about 900 feet of backs over me.

"The production in the early days was made from about an acre of ground, and the property consists of about 800 acres, so there is plenty of room to work."—Reno Gazette.

Around the State

Several stringers of galena and gray copper have been encountered in the face of the Spiro tunnel, now in a distance of 14,400 feet from the portal, according to a report received at the company's local offices recently.

Several mining men of the town are highly interested in the new find of tungsten and have hopes that it will prove a pay roll maker when development begins. At present forty pounds of the ore has been sent to Denver for analysis.—Iron County Record.

Interest in strontium mining in this community was intensified at Delta a few days ago when C. F. Winebrenner acquired a one-fourth interest in the five Rock Correll claims near Meadow from F. L. Byron, for which he exchanged fourteen city lots near the central part of Delta.

Within the past few weeks the Tintic Mill has received a few shipments of ore from the Horn Silver mine at Frisco. This property has a large tonnage of mill ore which could be handled very profitably at the Silver City plant but for the high freight rates, the charge being the same as to the Salt Lake valley smelters.

According to Manager E. J. Raddatz of the Tintic Standard mine, two new roasters are to be installed at the company's mill at Warm Creek. A tonnage of 140 tons daily is being handled by the seven roasters now in operation at the mill. The two new additional roasters will make possible the treatment of 190 tons daily. This piece of good news can mean only one thing—that excellent work is being done all along the line.

The steel for the new mill of the Silver King Coalition mine is now arriving at Park City. Sixty men are employed in cement work, carpentering, grading, excavating, etc., and it will be but a little while now before construction work on the mill proper will be commenced. Reports from the mine are of the most encouraging nature. Development work opening up ore reserves in new territory assures a bright future for the Silver King Coalition. About 300 men are now on the pay roll.

Frank Jardine, superintendent of the Imperial Lead mine in the Erickson district, Tooele county, went out to the mine several weeks ago with four men and is now doing some prospecting on the Tuxedo group of claims and other claims in Death canyon in the Erickson mining district. The Imperial has filed an application in the state engineer's office for the water of several springs in Death canyon to be used at the property of the Imperial Lead.

At one time chief of police of Virginia City, Nev., during the Comstock boom, "Uncle" Benjamin Lackye, 81 years of age and one of the best known prospectors in the state, died last week at the F. N. Brewer ranch home at La Sal. He had been a resident of La Sal country for thirty years and owned groups of claims in Lackey basin as well as in Lisbon valley. He was a native of New York, but came to the West in 1859 by way of the Isthmus of Panama. He is survived by one brother and a sister.

According to report conditions at the Cardiff mine in Big Cottonwood are exceptionally good. New ore is continually being developed. Shipments are being made steadily. One feature of this year's operations at the Cardiff is the fact that company trucks are making the climb to the ore bins at the mine. Formerly the ore was hauled from the mine to the ore bins at the mouth of South Fork, a distance of approximately two miles, by teams, and from thence to Lovendahl, the railroad loading point, by trucks.

Heber Christensen of Moab will leave in a few days with the party of government engineers connected with the geological survey, who will make a detailed survey of the San Juan and Colorado rivers from Bluff to Lee's Ferry in connection with the immense power project contemplated by the California-Edison Company. Mr. Christensen will be the chef for the party, which will consist of six men. K. W. Trimble, R. N. Allen, Bert Loper and J. W. Douglas are members of the party, which will be augmented by two other engineers.

Work on the old Buckhorn mine in Dugway district is expected to start soon, several men going out to the camp this week, says the Tooele Transcript. It is said that an effort is to be made to try to find the old Buckhorn vein from which Sam Gilson and several associates took out nearly \$100,000 worth of sensationally rich silver ore about thirty years ago. B. F. Cutler, who spent about twenty years in the Dugway district, and who is now deputy sheriff in Salt Lake county, made a trip out to the camp two weeks ago.

The shaft of the Stockton Standard Mining Company has reached a point about twenty-five feet below the 300-foot level, at which point the cutting of a station has been begun. C. F. Buehner, president of the company, says that the new hoist of the company is working very smoothly and that the physical condition of the property is excellent. Sinking will be continued until the shaft reaches the 400-foot level, where, according to Mr. Buehner, drifting will begin to cut the two fissures which lie to the east. Exploration of these fissures on the 200-foot level opened up mineralization of such a promising nature that the company decided that the formation deserved thorough prospecting at a greater depth.

Surface water at the Louise mine has caused a temporary change in the program of development, according to Manager R. O. Dobbs. When operations were resumed after the winter layoff, work was confined to that section of Louise territory tributary to the Maggie upraise. Here a good body of ore has been exposed, and as soon as the flow of surface water has abated somewhat, stoping of this ore will begin. While awaiting a favorable time for development of the Maggie upraise ground, work has been begun in the 1,200 tunnel level. Here drifting is being carried on at two points with machine drills. Excellent progress is being made. The face of the tunnel, Mr. Dobbs says, is driving along the overthrust contact in a formation well mineralized with sulphides. Some galena is showing.

TRADE NOTES

The Mine & Smelter Supply Co. recently sold an eight-foot Marcy roller mill to the Silver King Coalition Mines Co. for the new plant now under construction at Park City, Utah.

A new book on belt conveyors has just been published by the Link-Belt Company of Chicago, Philadelphia and Indianapolis. It is book No. 215. It fully describes the Uniroll and Multiroll Idlers recommended by this company.

The local branch of the American Steel & Wire Co., has sold to the Vipont Mining Co. 4,500 feet of 1 1-8 in. locked coil cable which is to replace the strand cable with which the Vipont tramway was equipped by those who built it and which has failed to meet requirements.

In Nearby States

ARIZONA

James S. Douglas, president of the United Verde Extension, has returned from a trip to Europe, where he investigated business conditions and the outlook for the future foreign copper market.

Mining men all over this section of the Patagonia district are very busy at present doing assessment work on their respective mining holdings of \$100 for each claim. Good miners are available in these parts by the big interests owing to the shut-down of the big copper properties, and are finding work in the assessment line.

It is reported that satisfactory arrangements have been made with the majority of the shareholders of the Consolidated Arizona Smelting Company, and a new organization, to be known as the Southwest Metals Company, is to take over the assets and business of the old concern. The new company is to start out with 100,000 share capitalization valued at \$50 per share. The old shareholders are to get these shares at \$20 per share.

The old Cumberland gold mine near Mayer, has been sold, it is reported, and the work of opening up the old producer is soon to begin. The mine, which was the property of Dr. W. Woodburn, of Des Moines, Iowa, is said to have been taken over by the Zonia Copper Company. The property consists of 13 patented claims, covered with heavy timber. On the ground is an old 10-stamp mill still in fair condition, and several other small buildings.

Herman A. Wagner, general manager of the Grey Eagle reduction plant, near Mayer, has completed arrangement for the purchase of the Great Western smelter at Mayer, it is reported, and plans to salvage the materials and machinery. The smelter was erected about five years ago by a company formed by Charles Batre and H. La Duc of St. Paul, and was in operation under the management of Arthur Cole, for six or seven months, when, following a strike in June, 1917, the fires were pulled, nothing having been done since.

BRITISH COLUMBIA

The Nettie L. Mine in the Trout Lake district, shipped its first carload of ore recently.

In the first six months of this year, the receipts of ore at the Trail smelter, were 208,484 tons, compared with 147,389 tons in the first six months of last year. Of the totals in the first six months of last year the ores received from mines not owned by the Consolidated Mining & Smelting Company of Canada were 61,098 tons, while in the first six months of the present year the ore received from mines not owned by the company amounted to only 3,154 tons. While the Consolidated Company is handling a much heavier tonnage this year than last, it is now almost entirely ore from its own mines.

The milling capacity of the Silversmith mine at Sandon is being doubled. To this end 35 men are engaged in dismantling the Silversmith mill and enlarging the Ivanhoe mill, acquired by the company recently. Much of the equipment of the Silversmith mill is being used in the reconstruction of the Ivanhoe. The Ivanhoe has a capacity of 50 tons daily and the Silversmith 150 tons. When alterations have been completed the Ivanhoe will have a capacity of 150 to 300 tons, depending on the grade of the ore, the richer the slower.

COLORADO

E. D. Payne, who is operating the properties of the Gold Empire Company at Empire, was in the city this week and reports that they have started active work on the Arvada tunnel, which traverses Covode mountain for a distance 3,000 feet, and when completed will open up all Union district in North Empire.—Idaho Springs Gazette.

According to the Georgetown Courier, the test mill-run made by the Palisade Copper Company from the Wheeling vein showed the ore to contain 183 ounces silver, 3-10 oz. gold per ton, 7.29% lead and 4.20% copper. The ore has been opened up for a distance of 30 feet, and is from six inches to two feet in thickness. A number of tons are ready for shipment and next week stoping will be commenced.

IDAHO

In the Sterling Silver property on Big creek in the Coeur d'Alenes the lower crosscut tunnel has been driven nearly 600 feet, passing through several stringers of quartz carrying good values in silver.

The lessees of the Western Union Mining property, northwest of Wallace, in the Coeur d'Alenes, have shipped ore having a gross value of \$54,454 since November 19, 1920, according to reports recently made by the board of directors of the company.

The Giant Mining & Development Company, in the Sunset district of the Coeur d'Alenes, reports the face of the drift in the property within 100 feet of the point where the two veins are believed to intersect. The vein is the full width of the tunnel and the face is sprinkled with galena the entire distance between walls, according to reports received at Spokane.

"Half a dozen mines will be added to the list of shippers from the Coeur d'Alenes just as soon as the reconstruction of the railroad up Pritchard creek is completed," said Charles G. Taylor, manager of the Giant Ledge Mining Company. The Giant Ledge will in all probability finish its mill this fall and will be ready to commence shipments.

The Bunker Hill smelter at Kellogg shipped 60,000 ounces of silver to the mint at San Francisco recently. The plant is handling about 100 tons of ore daily in one furnace. The ore is from the Bunker Hill mines and the mines of the Hecla, Caledonia, Sierra Nevada and Sidney Companies and the leasers of the Last Chance and on Big Creek.

Ore shipments from the Sidney property on Pine Creek in the Coeur d'Alenes to the Bunker Hill smelter has been made recently. A large quantity of ore is available for shipment at the property and development work is adding to the tonnage each day. The ore will average 50 ounces in silver and 47 per cent in lead to the ton. More than 100 tons have been mined since the new organization took over the Sidney.

George H. Walters, of Spokane, recently inspected the property of the Lucky Stone Mining Company's property in the Coeur d'Alenes, of which he is secretary. It is on McFadden gulch and is now the only property there which is working, although it is reported several others will resume shortly. Development will be from the main tunnel on the east side of the gulch, where a favorable showing of galena ore was opened last year. A new tunnel will be started on the west side of the gulch, where a stringer of quartz will be followed.

The Bunker Hill & Sullivan Mining & Concentrating

Company has completed the installation of a compressor on its property in the Hailey country of Idaho.

U. B. Hough of Spokane has been placed in charge of all outside construction at the property of the Armstead Mines Company of Talache. A contract has been let to build a 150-ton mill, also a contract for electric power has been signed and the staff of the mine has been enlarged and reorganized to handle the more intensive campaign that will push construction and development.

At a meeting of the American Commander Mining & Milling Company, recently held at Wallace, the following board of directors was elected: Patrick Johns, New York; J. A. Glowe and Harry Kinsbury, Mullan, and J. L. McCormick and Herman Marquardt, Wallace. Of the shares issued, 500,000 were represented in person and 887,000 by proxy, says the report. Officers will be elected in the near future. The property is located near Mullan. Operations in the tunnel have been suspended while machinery is being installed. Two or three feet of carbonate ore is reported exposed when work was suspended in a drift in the upper tunnel.

It is now believed that the management of the Imperial Mining Company has found the vein for which it has been searching for some time and that ore in it will prove of great value, according to reports at hand. The property is in the Burke canyon of the Coeur d'Alenes. The crosscut was run 500 feet without striking anything that looked like the vein, although several stringers of good ore were cut. Recently the management went back 200 feet from the face of the crosscut and started to drift west on a promising looking stringer. Workmen had gone only 12 to 15 feet when the stringer widened out to four feet of vein with crystalized lead scattered through it. Assays from some of this ore returned 26.7 per cent lead.

Ore bodies of large size and of great promise are reported to have been struck on the Utah-Bellevue disclosing a body of ore 41 feet wide, mainly of a milling grade, of course, but including two or three feet of clean ore on each wall. The rich ore is of silver and lead and carries some zinc and considerable native silver. The recently discovered ore body on the Minnie Moore is 46 feet wide and its chief content is silver and lead. The scene of the disclosure is a large open cut made many years ago and called to attention recently by a heavy rainfall which removed the surface covering and emphasized the presence of the metals.

MONTANA

W. R. Price, Helena mining engineer, who is said to be associated in the deal with Chicago and New York capitalists, has taken over the Curlew mine near Victor, Mont.

Plans are afoot for the construction of a mill at the Forest Rose mine of the Butte & Western Company at Jens, according to reports. Development has disclosed a large tonnage of ore, it is said.

Drifting operations on a couple of feet of good silver ore continues on the 400-foot level of the Butte & Plutus, according to report. The ore is in what is known as the Norwich vein.

Davis-Daly showing of ore on the 2,300-foot and lower levels continues very good, it is said. The maintenance of the high-grade character of the ore from the Colorado appears as one of its chief characteristics. Sinking of the Hibernia shaft continues.

Ore showing on the 2,300-foot level of the Colorado mine, where from five to six feet of ore ranging around 15 to 16 per cent copper was opened some time ago, is continuing it is said. Shaft sinking is under way at the Hibernia from the 600 to the 800-foot level.

The main tunnel of the new Champion mine and the shaft of the old workings of the property near Race Track are connected. The new workings were flooded by the water that remained in the bottom of the shaft, but no damage was done to the new property. The connection was made at the 600-foot level, by a tunnel which has been driven 1,800 feet. When the old mine is completely drained development work will be started, and much of the ore which was opened up 35 years ago will be mined through the new workings. Exploration of the old shaft to the 500-foot level shows that the mine is in good condition, and it is believed that mining on the 600-foot level can be carried on without many repairs.

NEVADA

There has been renewed talk of railroad connection between Ely and Pioche and the proposed link may be built in the near future.—Pioche Record.

"Death Valley Scotty," according to the Goldfield News, is spending a few days in the camp. He is making his home on the desert and running a ranch. He did not disclose any new gold finds while in camp.

J. F. Dwyer, superintendent of the Mandalay Mines Company's property in the Antelope range, near Sulphur, recently was at Winnemucca procuring supplies for the property. Arrangements are being made to resume work on the estate and send the shaft down to greater depth. This working is well equipped with hoisting plant, compressor and air drills.

President Harding nominated Joseph E. Gelder of Yerington, Mason Valley, to be surveyor-general of Nevada, a position made vacant by the resignation recently of Jack O'Sullivan. Mr. Gelder is engineer for an eastern mining company which owns a large copper property in the monzonite belt near Yerington and is well known in both mining and political circles.

N. H. Getchell has secured a bond and lease from Henry Lemaire of the mining property located at Gweno, fourteen miles west of Austin. This property has produced some very high grade gold ore in the past as well as silver, and Mr. Getchell, who has had two men at work on the property, has uncovered some very rich ore and thinks he is on the trend of a big body of rich silver ore, all of which carries gold values.

A shipment 15½ tons of ore running 2.99 oz. in gold and 83.70 oz. in silver, of \$142.87 per ton, has recently been made by the Nevada Rand Mines Company from its property 17 miles northeast of Nolan station at Walker Lake, in the Rand District, Mineral county. This shipment of ore and two others running \$115 and \$294 respectively, per ton, has been extracted by J. D. Walker, a well known Nevada miner.

E. P. Bowman of the Wyoming Mining and Milling Company, which owns the old Taylor property about fourteen miles from Ely, arrived during the month and announced the intention of starting up the company's mill in the near future. The mill has a capacity of fifty tons daily, which will be operated on ore from the dumps of the old mine, which carry values from \$11 to \$14 per ton. This ore will be sorted before milling and is expected to run about \$20.

From all accounts the old mining camp of Tuscarora was a strange sight on the night of June 30 and the morning of July 1, says the Elko Independent. Practically every claim in the Tuscarora district was relocated by its former owners, none of whom did the required amount of work for the year 1920 under the resolution of congress extending the time for doing it until July 1. At 12 o'clock on June 30 the hills and canyons were literally dotted with moving lamps and campfires marking parties of relocators out to reclaim their own ground or staking new locations for other parties.

Drifting from the 833 level of the Prince Consolidated mine deep shaft is progressing under the most favorable conditions, according to M. C. Godbe, general manager. The west drift, which is being driven to cut on the down-thrown side of the Great Western fault, the displaced portions of the ore beds so productive in the upper levels, is out a distance of thirty feet from the shaft on the 20th. In the east drift, the showing is especially promising, says the report. This drift, being driven to open up the "silver bed" found by diamond drilling, is in a formation heavily mineralized with iron pyrites.

The Big Indian mine, five miles north of Lucky Boy in Mineral county and a producer of note many years ago, is to be reopened and worked on a substantial scale by Henry Schepers of Salt Lake, who has secured a long-term bond and lease from the eastern owners. The property embraces 1,200 acres of patented ground in addition to several unpatented claims and is well equipped for mining. The plant includes a stamp mill with six unit-stamps, an assay office, mess-house, rooming house, office, electric lighting plant and reservoirs supplying water to the mill and all other buildings.

Three big trucks loaded with machinery for the Freiberg mine left East Ely, on the 16th, going south by way of Murray summit. The contract for moving the equipment from the railroad to the mines was taken by Truckman Bob Nichols and this is the second three-truck shipment within a short time. Despite the heavy nature of the job the transfer is being made without serious difficulty, which speaks well for both truck equipment and the roads over which the machinery has to be moved. The first shipment included a heavy boiler. Every effort is being made to get the machinery installed with as little delay as possible, as when this is done the Freiberg Company expects to be listed as an active producer of high-grade silver and lead ore.

WASHINGTON

The Cleveland mine, 18 miles west of Springdale, resumed operations recently, after being closed down since last fall. The mine is one of the former heavy producers of the section, and is equipped with a concentrator and flotation plant. Its values are chiefly in silver, lead and zinc.

The Lone Pine and Surprise mines, at Republic, owned by the Day brothers of Wallace, have shipped 15 carloads of ore, or about 450 tons in June, and 30 tons are being taken from these mines daily, according to reports received at Spokane. There is optimism among Republic people on account of many rumors afloat that the Day interests are to develop their properties to a greater extent than ever before and to erect a plant for the treatment of their own ores. There also is talk about a custom plant to be built for the treatment of all ores of the district.

Mining engineers of the Inland Empire will take an outing of three days, leaving Spokane August 21, for a visit

into the east Kootenai mining district of British Columbia, was recently announced at a meeting of the Columbia section, of American Institute of Mining Engineers. At Cranbrook they will hear an address by Dr. Scofield of the Canadian geological survey on "The Rocky Mountain Uplift as Applied to the East Kootenai." The party will visit several camps, including the great Sullivan mine where they will be entertained by engineers of the Consolidated Mining & Smelting Company. Arrangements have been made for transportation of about 50 persons, including the ladies.

Petroleum Notes

The Export Oil Corporation has closed a contract for delivery of 275,000 to 300,000 barrels of fuel oil to an English company. Delivery is to start immediately.

Two storage tanks for the Index Shale Oil Company which have been expected for some time came in Friday and will be taken up to the plant.—De Beque News.

Dr. David T. Day, prominent engineer and geologist, is quoted as stating that interests with which he is connected will construct a large shale plant soon in the Uintah Basin.

Following the discharge of about 900 men from extension forces by the Midwest Refining Company, the Standard Oil Company of Indiana will lay off about 1,200 men now working on improvements at its plant at Casper, Wyo.

C. T. Lupton, well known Denver geologist, has been appointed chairman of the Rocky Mountain states division of experts to assist the U. S. Geological Survey in estimating the petroleum reserves on government lands in the middle west.

The Carter Oil Company unloaded a Star 28 drilling rig in the De Beque yards and it was started on the way to the field on the 15th, towed by two large trucks. The rig will be erected on the Battlement structure south of De Beque near the Inland rig. Drilling operations will start in a few days.

The Paradise Oil & Refining Co. has signed a contract to drill a well in the Uinta Basin with prominent land and leaseholders. Operations are to begin just as soon as their geologists can make a suitable location for "spotting" the well. The land embraced in this contract totals 5,000 acres.

Operations have been resumed by the Carter Oil Company on the Beaver Valley structure, just west of Newcastle, Wyo. Work was stopped on the well some time ago, after the drill had gone down several hundred feet, and the company later decided to try the deeper sands as every indication supported the belief that oil was there.

S. W. Gibson, the superintendent of drilling for the Carter Oil Company in the San Rafael tells the Price Sun that the Carter expects to spud in there in about ten days. Several carloads of machinery arrived at Price over the Denver and Rio Grande are being forwarded by truck and otherwise. They are now getting water into the camp, this being hauled some thirty miles by auto and placed in large tanks. The Carter is spending thousands and will be heard from as time goes on. The company is not talking much for publication, but going right along with work that means something.

According to the Denver Post, the Western Pipe Line Co. will probably not lay a line from Salt Creek to Casper this summer. The reason given for the postponement is

the low price of crude, officers of the pipe line company stating that so long as the price of Salt Creek crude remains at 50c the producers will not be disposed to sell.

Two carloads of emergency oil well machinery arrived in Durango last night from the east, consigned to Farmington and McElmo oil men. Emergency machinery means extra accoutrements which may be needed when the oil begins to shoot toward the clouds.—Durango, Colo., Democrat.

Walter K. Campbell, an oil man of this city, with his wife, daughter and son, has started for California in a "gasoline bungalow," built upon a one-half-ton chassis, equipped with a motor from a five-ton truck. Their "gasoline bungalow" is complete in every detail, so they may stop wherever night overtakes them.—Oil & Gas Journal of Tulsa, 15th.

C. B. Osborn, chief geologist of the Midwest Oil & Refining Company; Harry A. Aurand, geologist for the company in charge of Colorado operations and F. M. Coffin, representing the company's geological work in Utah, were in Moab recently, checking up on the local structure and to make observations of the local development work.

John D. Rockefeller has disposed of all his vast holdings in the Standard Oil of New Jersey, the parent company, with the exception of 1,000 shares of common stock, valued at \$106,875, according to an account published by the New York World. The World's list shows that John D. Rockefeller, Jr., now holds 452,080 shares of the common stock and 88,970 shares of preferred; the Rockefeller General Education board, 170,320 common and 56,779 preferred; the Rockefeller Foundation 196,000 common and 55,000 preferred, and the Laura Spellman Rockefeller Memorial fund, 40,000 common and 19,000 preferred.

IMPORTANT DEVELOPMENT IN ELY CAMP

One of the most important mining enterprises in the Ely district is being proven out at the Mitchell tunnel of the Boston and Ely Consolidated Mines company, located one mile west of Ely and about 200 feet from the main line track of the Nevada Northern, where large bodies of direct smelting copper ore are being steadily developed.

Although extensive mining has been carried on in the Ely district for the past fifteen years, it is only recently that high-grade copper ore in commercial quantity has been demonstrated east of Ruth, hence this development by the Boston Ely company is of great local importance, as it seems to prove the extension of commercial bodies of copper ore for a distance of several miles toward the eastern end of the mineral zone.

In addition to the discoveries of the Boston Ely on ground originally owned by the Ely Northern company, considerable bodies of zinc, lead and copper ores are now being developed on ground owned by the Ely Calumet company, operated under a lease by A. D. Meyers and associates. This ground is situated about a mile and a half east of the Ely Northern claims and immediately north and east of the town of Ely.

For the last ten years the United States has produced an average of 73 per cent of the copper production of the entire world. At the present rate of purchase, Germany will hold 25 per cent of the world's stocks of copper at the end of this year and Japan will hold 20 per cent of the world's stocks.

Personal Mention

Morton Webber has left New York on his way to Mexico.

Charles F. Brown, well known civil engineer of this city, left a few days ago for a professional trip into Garfield county.

Sterling B. Talmage, E. M., of Salt Lake, has gone down into Arizona on professional business, in the vicinity of Prescott and Jerome.

James M. Cunningham, of Abilene, Texas, was a Salt Lake visitor about the middle of the month, following a trip of inspection to Nevada mining properties.

Charles Janin, in his capacity as consulting engineer to the U. S. Bureau of Mines, will make a study of cold-water thawing as used in alluvial mining in Alaska.

O. H. Johnson, manager Marcy mill department of the Mine & Smelter Supply Co., with headquarters in Denver, was a recent visitor to the Salt Lake branch of the company.

John A. Lenzi, who engineered the deal by which the old Vipont mining property was sold to the present big operating company, a year ago, recently left for the district on business connected with another deal, now said to be incubating. He returned Wednesday.

J. B. O'Sullivan, who has served nearly eight years as United States surveyor general for Nevada, has forwarded his resignation to the Interior Department at Washington, asking to be relieved at once. He is now in Los Angeles, where he has accepted a position with the Standard Oil Company.

A. O. Gates, for years with the Dodge Co., of Mishawaka, Ind., has returned to Salt Lake after a several months trip to the East. While still representing his company in this territory, Mr. Gates expects to open offices here and practice his profession as consulting mechanical engineer.

Oscar Lachmand, E. M., of Spokane, and several years ago on the staff of the United States Mining Co., was a visitor in Salt Lake during the month. He came over from Spokane to make a trip to the Peacock Copper property, in Beaver county, previous to continuing his journey to New York. He enjoyed meeting a large number of old-time friends while here.

After a varied mining experience of many years in Nevada, Eugene Grutt, one of the original locators at Rawhide, has moved to Utah and is now superintendent of the Bingham-Galena property in Bingham Canyon. Until recently Grutt was identified with the Broken Hills Silver Corporation, operating in the Broken Hills district.—Nevada Mining Press.

Charles A. Mitke, consulting engineer of Bisbee, has returned from Cambridge, Mass., after completing a series of lectures at the Massachusetts Institute of Technology.

C. Yale Pfoutz, of Salt Lake City, who has been metallurgical engineer with the Utah Copper Co. for a number of years, has accepted the position of Assistant Professor of Metallurgy at the Colorado School of Mines. He will take up his new duties on September 1.

An honest failure is much better than a fraudulent success.

We married men are glad this is a free country, even if we can't prove it.

SALT LAKE MINING STOCK QUOTATIONS

The range of the market from July 9th, 1921, through July 22nd, 1921, inclusive. Quotations furnished by J. A. Hogle & Co., direct wires to all leading markets, 169 So. Main St., Salt Lake City, Utah, and ground floor of Eccles Building, Ogden, Utah.

Stock.	Open.	High.	Low	L. S.	CLOSING.		Sales	Stock.	Open.	High.	Low	L. S.	CLOSING.		Sales
Alta Mich.					Bid.	Asked.		Iron Blossom	.18	.18	.18	.18	Bid.	Asked.	
Antelope Star.	.01½	.01½	.01½	.01½	.01	.02	2,000	Indian Queen.					.00½	.01	2,000
Alta Con. ....	.01½	.01½	.01½	.01½	.01½	.02	3,000	Judge M. & S.					2.00	2.80	
Alta Tiger						.01		Keystone						.50	
Albion Cons...	.05½	.05½	.05½	.05½	.05	.05½	4,415	Kennebec						.05	.10
Ann. Metals					.00½	.00½		Lehi Tintie	.03½	.03½	.03½	.03½	.03½	.03½	9,000
Ann. Cons. M.					.02	.05		Leonora	.01½	.01½	.01½	.01½	.01½	.02	2,000
Alta Tun. ....	.03½	.03½	.02½	.03½	.03	.03½	11,000	Monzonite						.00½	
Addie	.02	.02	.02	.02	.01½	.02½	2,000	Mammoth						.55	
Bullion	.02½	.02½	.02½	.02½	.02½	.02½	1,000	Miller Hill						.02	
Big Hill					.01	.02½		May Day	.01½	.01½	.01½	.01½	.00½	.01½	2,000
Big Cot. Coal.	.02½	.03	.02½	.02½	.02	.03	2,000	Mason Valley					1.50	1.75	
Bing. Galena	.25	.27½	.19	.25	.24½	.25	85,000	Moscow						.10	
Beaver Cop...	.01½	.01½	.01½	.01½	.01½	.01½	4,000	Mich. Utah	.03½	.04	.03½	.03½	.03½	.04	4,500
Bay State					.10	.15		New Quincy	.03½	.03½	.03½	.03½	.03½	.03½	28,000
Black Metals	.03½	.03½	.02	.02	.02	.02½	9,700	Naildriver						.20	
Cent. Eureka					.01	.02		No. Standard	.03	.03½	.02½	.02½	.02½	.03	9,000
Cedar Talis.						.01		Ophongo						.01	
Colb. Rexall.	.27	.32	.27	.29	.28½	.29	17,800	Old Emery					.10	.20	
Colorado Con.	.02½	.02½	.02½	.02½	.02	.02½	2,000	Plutus	.25	.25	.22½	.23	.23	.25	3,400
Crown Point.	.02	.02	.02	.02	.01½	.02½	1,500	Prince Con.	.23	.23	.19½	.21	.20½	.21½	35,300
Cardiff	1.20	1.22½	1.17½	1.20	1.17½	1.25	1,800	Paloma					.01	.02	
Croff						.00½		Pioche Bristol	.00½	.00½	.00½	.00½	.00½	.01	2,000
Daly					1.00	2.25		Price Mining	.03	.03	.03	.03	.02½	.03½	4,500
Daly West					2.25	2.75		Provo	.03	.03	.03	.03	.09	.05	500
Dragon					.03	.05		Reeds Peak						.01½	
Demijohn Con	.00½	.00½	.00½	.00½	.00½	.01	1,000	So. Standard	.11½	.11½	.11½	.11½	.11	.12½	4,000
Emma Silver	.01½	.01½	.01½	.01½			13,000	Sells	.04½	.05½	.04½	.05½	.05	.05½	16,100
Empire Mines					.02	.05		Syndicate						.00½	
Empire Cop					.04	.10		Sil. King Coal.	1.60	1.62½	1.50	1.60	1.55	1.62½	2,865
East. Prince						.00½		Sil. King Con	.45	.56	.39½	.56	.56	.58	2,715
Emerald						.05		Sioux Mines						.02	
Eureka Mines	.03½	.03½	.03½	.03½	.03½	.04½	2,500	South Hecla					.35	.45	
E. Crown Pt.	.01½	.01½	.01½	.01½	.01½	.01½	5,000	Silver Shield	.18	.20	.17	.17½	.17	.17½	45,300
E. Tin. Coal.	.00½	.00½	.00½	.00½	.00½	.00½	1,000	Tar Baby	.01½	.01½	.01½	.01½	.01½	.01½	30,000
E. Tin. Con.					.09	.11½		Tintie Central						.01	
East Antelope						.00½		Tintie Stand	2.45	2.45	2.37½	2.37½	2.37½	2.40	10,350
Eureka Lily	.09	.09½	.09	.09	.09	.09	19,700	Uncle Sam					.00½	.02	
Eureka Bull.	.07	.07½	.07	.07	.06½	.07	7,500	Utah Con.	.07			.07	.00½	.01	
Galena Mines	.02	.02	.02	.02	.01½	.02½	1,000	Union Chief					.00½	.03	
Gold Chain						.05		Victor Con.						.01	
Grand Central						.27		West Toledo	.01½	.02	.01½	.01½	.01½	.03	26,000
Great Western						.03½		Walker Mng.	2.45	2.50	2.42½	2.50	2.37½	2.42½	5,900
Hamburg Mns.					.01			Woodlawn	.06½	.08½	.06½	.08½	.08½	.09	18,000
Howell	.04½	.05	.04½	.04½	.04½	.04½	6,000	Yankee Con.					.00½	.03	
Iron King	.09½	.10	.09½	.09½	.08	.10	1,200	Zuma					.03	.03½	

ORE SHIPMENTS

During the two-week period ending on the 22nd the mines of Park City reported the shipment of 2,748 tons of ore, as follows:

Judge Allied Companies	734
Ontario Silver Mines	662
Silver King Coalition	1,332

The producers of the Tintie district, during the same period shipped 289 carloads of ore, as follows:

Tintie Standard	93
Chief Consolidated	68
Iron King Con.	26
Eagle & Blue Bell	19
Victoria	21
Dragon Con.	18
Iron Blossom	18
Swansea Con.	6
Mammoth	6
Gold Chain	3
Eureka Hill	3
Gemini	3
Colorado Con.	3
Eureka Mines	1
Sunbeam	1

Cotton mills of Lowell have sold recently to their employes more than 300 tons of anthracite coal at a price \$4.26 less than the rate charged by the local retail dealers.

ASSESSMENTS PENDING

- Godiva Mining Company, 1c a share. Delinquent Aug. 1. Sale day September 1.
- Price Mining Company 1/2c a share. Delinquent Aug. 2. Sale day Aug. 22.
- Alta Tunnel & Transportation Company, 1c a share. Delinquent August 9. Sale day September 3.
- Lehi Tintie Mining Company, 1/2c a share. Delinquent August 12. Salt day August 31.

MAY RIVAL SALT CREEK

The flowing well of the Bair Oil Co., at Lost Soldier, in Carbon county, indicated the force behind the oil when it was sufficient to lift a column 12 1/2 inches in diameter 1270 feet. To date 5 producing sands have been discovered in the Lost Soldier field. One of the largest known structures is located in Carbon county. It begins northwest from the Bair development and runs in a southeasterly direction for more than 30 miles with either gas or oil proven along the entire length every 3 or 4 miles. Oil has been discovered at Lost Soldier, Wertz and Ferris and beyond and gas at each of the places named and in between. Producers & Refiners Corporation, Bair Oil Co., Ohio Oil Co., General Petroleum Co., and several other companies have not less than 500,000,000 cubic feet of gas shut in on this great anticline. West of this structure, with an uplift dividing them, is another great anticline in what is known as the Red Desert country.—Wyoming Oil World.

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Steel Industry Growing to Adult Proportions in Utah

The iron and steel manufacturing industry of Utah is on the verge of casting aside its swaddling clothes and assuming its place in the ranks of the great basic industry grown-ups. Plans are rapidly maturing for the utilization—as a beginning—of at least 1,000 tons a day of iron ore from the matchless deposits of the Iron county field, with the attendant consumption of approximately 800 tons of Utah-made coke and 300 tons of fluxing limestone every twenty-four hours. And this means that when the undertaking is whipped into form the Utah Steel Corporation, now being reorganized, amplified and expanded, will be in a position to supply this western portion of the country with at least 15,000 tons of finished product monthly, while from 2,000 to 3,000 men will grace the pay-rolls of this mammoth manufacturing company.

A glance at the accompanying illustrations will quickly dispel any preconceived idea that this enterprise is a stock promotion scheme, designed to trap the unsophisticated investor. These pictures are photographic glimpses of the plant already in operation and which is and has been for several years making money for those interested, and in the building and equipment of which over \$1,600,000 has already been expended. This plant is located at Midvale, in the vicinity of the great ore-treating establishments of the American Smelting & Refining and the United States Mining, Smelting and Refining companies, on the banks of the Jordan river, about a dozen miles south of Salt Lake City.

"Sturdy Oaks from Little Acorns Grow"

The plans of the Utah Steel Corporation have developed along altogether natural lines; they have developed just as most great industrial enterprises have developed. In the beginning, the father of the Rosenblatt boys began by buying up old scrap iron and remelting it, so that local foundries and machine shops could get reasonably priced materials for such castings, etc., as the local trade required.

From that initial beginning the business was enlarged and expanded until it grew into its present pretentious condition. And now it is proposed to go beyond the point of relying for business on the sale of products manufactured from the stocks of remelted old iron—which has simply outgrown itself—and begin the smelting of iron ore and the turning out of a large variety of finished products, including structural materials, iron and steel plate, tin plate, heavy and light castings—in fact everything from pig iron and steel billets to everything which the rapidly expanding western trade is now compelled to buy and ship across the continent.

Present Status and Future Plans

According to M. S. Rosenblatt, general manager of the

corporation, who recently returned from the east, \$1,000,000 or more has been pledged by financial interests identified with independent eastern steel manufacturing concerns, who recognize the fact that the time has arrived to establish large works in Utah and begin the utilization of Utah iron ores on an extensive scale. All that is asked is that Utah and other western capitalists who must derive unmeasured advantage from the large-scale operations of the concern shall show their faith and progressiveness by doing their share in supplying the capital required to round out the enterprise. For more than twenty years the business men of Utah have been waiting for the opportunity that now is within their grasp. Unquestionably they will seize it.



General View of Utah Steel Corporation Plant, Midvale, Utah.

In the present plant of the Utah Steel Corporation there is the nucleus of a mighty industry which means the building of a railroad from Lund into the iron deposits without waiting for the advent of some chimerical, all-important combination that might overshadow the mammoth steel concerns of the Atlantic seaboard and great industrial centers of eastern states. It means the utilization of much more Utah coal, the building and utilization of many new bi-product coke ovens, the opening up of lime quarries and the expansion and strengthening of Utah industries and business enterprises in all lines; it means the addition of millions to yearly pay-rolls in the state and the permanent establishment of a gigantic basic industry that will endure through all time.

The basic open hearth furnace department of the present plant is capable of producing 6,000 tons of steel month-

ly. This is to be increased to 15,000 tons a month through the installation of a 400-ton blast furnace and such other equipment and devices as go to make a complete unit of a modern steel plant. To that end the existing corporation is being reorganized for the purpose of increasing its capitalization from \$2,500,000 to \$5,000,000, thus paving the way for the admission of new capital into the enterprise to the extent of \$2,000,000 or \$3,000,000.

How One Big Utah Iron Deal "Flivvered"

Nearly twenty years ago, it will be remembered by men who have followed the mining business in Utah and the West, Peter L. Kimberley, of Sharon, Pa., had practically rounded out a deal that had for its purpose the development on a huge scale of the iron deposits in Iron county, Utah. Options were secured upon which payments aggregating nearly a quarter of a million dollars were made. The



Pouring Building of Open Hearth Furnace Department, showing ingot moulds, ladle furnaces and overhead traveling cranes.

iron deposits were experted and much development work, surveying and patenting were done. Kimberley had rounded up a combination of foreign and United States capital and the day approached when final payments were to be made on the properties and the great steel corporation of the country—then getting into full swing—was to be given real competition.

That deal fell through because, as Mr. Kimberly tersely stated at the time, he "had agreed to be good"—that it was not desired that the Utah iron deposits be utilized at that time. Kimberly was paid handsomely to throw up his options and quit. This bit of promotion history has never before been made public; the public never learned the specific reason why that deal, about which so much was written at the time, failed of consummation. During the intervening years many deals for Utah iron have been "on and off again," largely, it is presumed, because nobody was ready to cut loose on the scale contemplated by the promoters.

UTAH COPPER RESUMPTION DATE UNCERTAIN

Col. D. C. Jackling, managing director of the Utah Copper who, with a party of friends had spent a week in Yel-

lowstone park, was in Salt Lake for a few hours on company business, previous to his return to San Francisco last Monday. With respect to resumption of operations by the Utah Copper company, Mr. Jackling said there was nothing to add to the statement made a week previous when he was quoted as follows:

"The situation," Colonel Jackling said, "may be summed up as being neither a question of weeks nor years. It is not a question of weeks, for there is no immediate prospects of an early resumption of production; but, on the other hand, it will not be a question of years, for the production of copper is not keeping pace with the consumption. The demand will soon overtake the supply. When some thing like a reasonable demand comes from foreign countries for copper, the situation will change for the better. The demand for copper will follow the demand for other raw materials. Since the war we have sold copper at prices which before the war we thought would mean ruin to us."

NEW OUTLET FOR UTAH COAL

Construction of special coaling barges and a mammoth storage dock at Alameda, Cal., in San Francisco bay, at a cost of approximately \$700,000, will make possible the use of more than 125,000 tons of Utah coal annually on Trans-Pacific liners and coastwise vessels.

This announcement was made recently by Frederick A. Sweet, president of the Standard Coal Company of Utah upon his return to Salt Lake. Mr. Sweet announced that the new docks at Alameda are completed and that two big coaling barges are in operation, coaling all transport vessels of the navy department on the west coast.

A contract was recently made with the navy to supply Utah coal for naval transports entering San Francisco bay. The naval contract alone, Mr. Sweet says, calls for delivery of more than 100,000 tons annually.

The storage docks at Alameda, which have a frontage on the bay of 740 feet and are equipped with a gigantic traveling bridge, have a permanent storage capacity of 150,000 tons.

NEW CONCENTRATING TABLE COVERING.

E. I. duPont de Nemours & Company have just issued a folder describing in detail the qualities of "minefab," their new covering for concentrating tables. The duPont Company is, of course, well known as having manufactured for more than a hundred years explosives for mining purposes, and it may be added it also is an important maker of coated fabrics.

This work has involved the development of a large number of special fabrics for varied industrial uses and has led into the production of "minefab." This product is described as a specially treated fabric of great tensile strength made permanently impervious and flexible by the thorough impregnation of both its surfaces with a non-deteriorating waterproof compound, highly resistant to chemical action and to abrasion.

It is said to be the only material ever made for the specific purpose of covering concentrator tables, and a long period of service tests which gave most satisfactory results have led the company to recommend it as thoroughly satisfactory for the treatment of all ores.

HUNTINGTON BEACH OIL FIELD SITUATION.

"There is nothing phenomenal about the geologic nature or the productive possibilities of Huntington Beach oil field," said R. E. Collom, California state oil and gas supervisor, in a recent weekly press bulletin published in the July issue of the Mining and Oil Bulletin of Los Angeles. "If given a fair chance," he continued, "it will make a good field. At present the estimated probabilities of productive area are liberally indicated as 1,500 acres, and it will ultimately take its place with the smaller oil fields of the state, providing, after the stock jobbing orgy is over, it is recognizable as an oil field."

Many Wells Drilling, But Few Producers

"During the week eight new wells were reported ready to drill in the Huntington Beach oil field. There are 65 or more wells in progress of drilling.

"In spite of the great drilling activity during the eleven months since the first well was drilled into production, only 18 wells are producing.

"There is no partly developed field in the state where the drilling of successful producers is attended with greater uncertainties as to relative positions of water and oil sands. The situation is further complicated by the growing congestion of drill holes on town lot holdings.

"There are a number of these holes which could not reasonably be expected to yield a profit over the costs of development even if properly drilled.

"To the investment hazard, because of inadequate acreage per well, must be added the inevitable damage to oil wells and the oil field itself which comes from congested drilling. Experienced oil operators are having great difficulty in properly excluding unexpected water sands in this field in order to get producing wells.

"The managers of concerns whose principal energies are directed toward the realizations of quick returns from the sale of stock cannot indefinitely circumvent these conditions of fact.

"The Huntington Beach oil pool existed long before town lots were laid out, and there is no worthy reason why this pool should be made the theatre of stock speculation instead of normal oil field development.

Acreage Necessary for Economical Development.

"Experience of normal development in California shows that an oil well, in order to be a going concern, should have an allotment of at least five acres from which it can draw oil with a minimum amount of interference. Oil wells are normally operated for profit, and it is fair to assume that, if greater profit could be made by drilling wells closer together than is now the practice in developed fields, they would be so drilled.

"In Huntington Beach oil field it requires anywhere from 10 to 75 town lots, dependent upon their size, to make the equivalent of the minimum five acres a normal oil well needs.

"Many holdings fall far short of this minimum area. Considering the costs of drilling, high operating costs, and the depths of wells, it is probable that five acres is not sufficient for economic operation.

"In order to yield a profit to the investor, these small tracts must first return the costs of financing, advertising, exorbitant salaries, and commissions on sales of stocks, in addition to the ordinary costs of development and production.

"The average cost of drilling to production at Hunt-

ington Beach is over \$65,000 per well. Depending upon depth to oil, difficulties incident to shutting off water and sand troubles, drilling costs alone vary from \$40,000 to \$90,000 per well. The output of present producers under flush conditions ranges from 30 to 2,000 barrels per day. Eighteen wells are now producing at a daily rate of less than 400 barrels per well. Only one well is producing over 1,000 barrels per day. The production comes from depths varying from 2,300 to 3,700 feet."

CARBON COUNTY COAL NOTES

An increase in the production is planned for properties of the Spring Canyon district. The Spring Canyon Coal company will open its third mine in a few days, furnishing employment for about sixty men. Last week this company operated five days and would have worked six had cars been available. During the last few days the Standard Coal company at Standardville has put on about sixty men. Despite the plans of these companies to increase production, it is said, there is an ample supply of labor for all purposes.

Independent Coal and Coke company at Kenilworth will be represented at St. Louis, Mo., September 1st, 2nd and 3rd, by a mine rescue and safety first team from its mine, according to an application sent to Dr. F. S. Murphy of the United States bureau of mines at Salt Lake City last Wednesday. The occasion is the annual first aid and mine rescue contest, conducted under the auspices of the United States bureau of mines. Several other teams are expected to represent this state. Entries must all be in by the middle of this month.

Coal traffic with the West and the Northwest is picking up, a very sudden spurt having come during the past week, so that the Denver and Rio Grande is now sending over Solder Summit two hundred and fifty cars a day, west-bound. This is relieving the three hundred and fifty cars that have been held loaded with coal on the sidings at the Carbon mines, and is calling out fifteen additional locomotives that have been held in waiting on sidings in the Salt Lake City yards. There are now two hundred and twenty-four engines in service on the Utah lines of the local road.

There is an abundance of soft coal throughout the state at the present time, but buying orders are coming in so slowly that hundreds of men at the mines are working only about half the time. A solemn warning has been sounded that unless a large number of people store coal now there will be a serious famine next winter when the storms interfere with the transportation of fuel. People should place their orders to be delivered during August. The price is not going to be lower and consequently there is no reason for delay. If those who have the opportunity of buying coal during the summer months take advantage of it there will be ample during the coming winter months.—Price Sun, 5th.

KEMMERER COAL CO. INCREASING MINE FORCE

A letter from Gomer Reese, superintendent of the Kemmerer Coal Company, Kemmerer, Wyoming, dated August 10th, says:

"I wish to inform you that our No. 6 Mine, Sublet, Wyo., will be prepared to reopen on the morning of August 16, and will be able to place from 175 to 200 miners between then and the first of September, or as fast as we can clean up the working places for the men. Our No. 1 and No. 5 mines are working full time, employing a large force of men and putting out a large tonnage."

FASCINATION OF GOLD-HUNTING EXEMPLIFIED AT KATHERINE

By William P. DeWolf.

Kingman, Arizona, Aug. 10.—Have you ever seen a mining camp in the making? Watched the prospector search for ore like a golfer peering around in the rough for a lost ball? Seen the miner erect rude "monuments" of stone to mark the boundaries of a claim, and with a hand more accustomed to the feel of a pick than a pencil laboriously write out his location notice which announces to all and sundry that he "claims by right of discovery 1,500 feet along the course of the vein, lode or deposit together with its dips, spurs and angles?" Trailed along while he "prospected" an outcrop, and witnessed the gleam of exultation in his eye when "colors" streamed comet-like across the bottom of his diminutive "gold pan?"

Have you shared the pride of the "pioneers" over the arrival in the camp of the first plant of mining machinery? Been among those present when the first building came lumbering in astride four wheels and squatted down amid the sage, a veritable ship of the desert at anchor in her home port? Seen the campsite gradually fill with similar nondescript tramps of desert voyaging? Looked as wise as an owl at a piece of quartz, and stated casually, very casually, just how much a ton it would assay in gold?

All of these things, and more, are being done in the new camp of Katherine, located in Union Pass about 35 miles from here. Katherine is a mining camp in the making and presents unmistakable promise of being the scene of the next big "gold excitement." The forerunners of the "rush" that is predicted for early fall are already developing properties there under mineralogical conditions which favor financial success. A number of them are internationally prominent in mining affairs. This fact in itself speaks well for the new camp and favors its receiving the investment recognition that is due its unusual mineral showing. The strength and magnitude of this showing has encouraged some of the operators to refer to the Katherine district as the "American Rand." The right to this title time and development alone can demonstrate.

The veins of the district are a quartz replacement of calcite in the granite. They are true fissures having northeast-southwest course, and are intersected at an oblique angle by numerous cross-veins. The latter appear to be fully as worthy of mining effort as are the main fissures. The area of ore distribution at Katherine as at present recognized is about three by five miles. It seems probable, however, that the area will be appreciably expanded within a short time. Even now work is under way which may bring about such a result.

About fifteen properties are now being developed. The list includes the Katherine mine, the Katherine Extension, the Miller and Murphy group, the Treasure Vault, the Katherine Mohawk, the Gold Chain, the Sunbeam, the Adams, the Revenue, the Roadside, the Arabian and the Sheeptrail properties. It is stated that development will soon be under way at the Nevada-Katherine, the Iris, the Shaw, the River Range, the Big Four and the Curtin-Mahoney properties. Report also has it that work is to be resumed in the Frisco mine and at the Federal property. Plants of machinery are in operation at the Katherine, the Katherine-Extension, the Arabian and the Gold Chain properties, Machinery is being installed at the Adams property, and is soon to be installed, it is said, at the Sunbeam property.

J. Jay Miller and George J. Murphy are the latest mining men from outside points to take over and develop mine acreage in the Katherine district. Miller was formerly in

charge of a large producing mine at Silver City, Idaho, and is half-owner of the Lost Camp gravel mine in Placer county California, a gold proposition that is netting about \$12,000 a year. Murphy resigned the management of the Luning Consolidated Silver mine to invest in the Katherine district, and was formerly superintendent of the Gypsy Queen mine at Tonopah and of the Tonopah Dividend property in the Divide district.

Several weeks ago Messrs. Miller and Murphy took an option on the Vrang group, located in the vicinity of the Lady, the Katherine and the Katherine Extension properties. The Vrang group is traversed by a well mineralized vein of the camp. Gold values in the Vrang vein are said to range as high as \$15.00 a ton at surface. Surface trenching is now being done for the purpose of "spotting" a shaft-site. This work is to be followed by development work at depth. Announcement is made that mine timbers and the other essentials will be at the property before the preliminary testing of the vein is completed.

Local and outside mining men are following with interest the development work under way at the Katherine Extension property, where a crosscut is being driven at a depth of 250 feet to determine the ore-yielding possibilities of the northeast continuation of the big Katherine fissure. The results to date are very encouraging and indicate that pay-ore in place will soon be encountered. In the adjoining Katherine mine several million dollars worth of ore has been blocked out in the Katherine fissure. The development work under way at the Gold Chain property is of equal interest in mining circles as it appears probable that an orebody of value will soon be found there.

\$23,000,000 MORE FROM ALASKA.

The United States geological survey, of the department of the interior, has just made public figures for 1920 on the mineral resources of Alaska, prepared by Alfred H. Brooks.

The value of the mineral output of Alaska in 1920 was \$23,307,757; in 1919 it was \$19,620,913. The gain in 1920 was due entirely to the increase in the output of copper, which was 47,222,771 pounds in 1919 and 70,435,363 pounds in 1920. Eight Alaska copper mines were operated in 1920, eleven in 1919. The value of the total mineral output of the Territory during forty years of mining is \$461,474,789.

Value of Metals Produced in 1919 and 1920

	1919	1920
Gold	\$ 9,426,032	\$ 8,365,560
Copper	8,783,063	12,960,006
Silver	705,273	1,039,364
Coal	343,547	355,668
Tin	73,400	16,112
Lead	72,822	140,000
Platinum minerals	73,663	160,117
Petroleum, marble, gypsum, etc....	143,113	266,830
Total	\$19,620,913	\$23,303,757

In 1920, seventeen gold-lode mines and five prospects were operated and produced gold worth \$4,473,687.

The Alaska gold-placer mines have produced in all gold worth \$217,885,000. In the summer of 1920, 488 gold placer mines, large and small, employing 1,987 men, were operated and during the previous winter 82 mines, employing 318 men.

The value of the output of gold from placers was \$3,873,000 in 1920 and \$4,970,00 in 1919.

METAL MINING IN UTAH—MIDYEAR CONDITIONS

The metal output of Utah in 1921 will be unusually small, judging from present conditions of the metal market, according to V. C. Heikes, of the United States geological survey, department of the interior. The output of gold, silver, copper, lead, and zinc in 1920 was valued at \$49,744,334, an increase from \$45,169,328 in 1919. That production will be far less in 1921 than in normal times is clearly indicated by the reduced shipments of ore and bullion and the fact that most of the smelting plants are operating at minimum capacity. In June, 1921, the lead plant at Murray was using only two out of eight blast furnaces, the Midvale smelter was using four out of seven, and the International plant was using only two. Copper smelting was at a low ebb, as the Utah Copper Company closed its mine and mills in April. A ray of hope for metal mining is seen in the fact that wages are lower and that the freight rates on ore and bullion have been reduced, but these improved conditions do not compensate for the excessively dull domestic market for copper, lead and zinc and the absence of demand from foreign countries.

Gold

Gold valued at \$2,014,556 was produced in Utah in 1920, a decrease from \$2,159,471 in 1919. The output of gold has been steadily decreasing since 1911, and it will be notably less from copper ore and siliceous ore in 1921. Most of the gold comes from the lead ores and copper ores of Bingham and the siliceous ores and lead ores of the Tintic district. The shipments from Tintic were less in the first part of 1921, and several of the copper and lead mines of Bingham were closed. Gold-bearing ores in Piute and Boxelder counties continue to be mined and treated as in 1920.

Silver

The output of silver in Utah in 1920 was 13,106,969 fine ounces, valued at \$14,286,596, an increase from 11,649,961 ounces in 1919. The output in 1920 was somewhat above the average of the last ten years, but the total for 1921 will probably be far below normal. In 1921 the producers of silver-lead ore at Park City have had difficulties over smelter contracts, and several of the mines of Tintic are closed on account of the expense and difficulty in marketing ores. The Chief Consolidated Mining Co., the largest producer of silver in 1920, has, however, upheld its shipments, and the Tintic Standard Mining Co., the second silver producer of the State, has not only shipped more smelting ore in the first half of 1921 but has completed and operated its milling plant for siliceous silver ore. The Vipont Mining Co., operating in Boxelder county, has also upheld the production of silver ore treated by flotation.

Copper

The production of copper in Utah in 1920 was 116,931,488 pounds, valued at \$21,515,348, a small decrease from that in 1919. The Utah Copper Co., which produces most of the copper of Utah, was active in January, February, and March in 1921 and produced nearly 24,000,000 pounds of copper, but the mine was closed in April. The Utah Consolidated Mining Co., a producer of both copper and lead, closed its mine at Bingham in February. The Tintic district contributes a comparatively small part of the copper output of the State, less than 3 per cent of it in 1920.

Lead

The output of lead in Utah increased from 123,829,051 pounds in 1919 to 140,838,113 pounds in 1920. The lead out-

put was somewhat normal in 1920 and will probably be far below normal in 1921. The United States Mining Co. has continued to ship lead-zinc ore from Bingham, but the Utah Apex and the Utah Consolidated mines, both large producers of lead, were closed. The mines at Ophir, in Tooele county, were closed in January, and the output of lead from Park City is less than in 1920. In the Tintic district the Tintic Standard and Chief Consolidated mines have shipped more lead-bearing ore than ever before, but the output from the other mines of the district is much less.

Zinc

The output of zinc in Utah was 8,157,739 pounds in 1920, an increase from 4,431,024 pounds in 1919. As there was no demand for the metal in 1921 and the price was unusually low, no effort was being made to produce zinc in Utah. The electrolytic zinc plant at Park City was closed early in the year because the rate for electric power was greatly increased, contrary to the agreement with the power company. Zinc concentrates from the ores of Bingham and from tailings at Midvale are not being marketed, and the Scranton mine in Tooele county is closed. Later in the year the Utah Zinc Co. will be ready to make zinc oxide from the ore of the Tecoma mines in Box Elder county.

Dividends were paid in the first part of 1921 by the Utah Copper, Tintic Standard, Grand Central, Silver King Coalition, Gold Chain, Eagle and Blue Bell, and Chief Consolidated companies.

SILVER KLONDIKE CUTS PORPHYRY DIKE

Operations are being pushed with vigor by the Nevada Silver Klondike Mining Company recently formed by Colonel Maurice J. Fink and backed by the well known mining firm of Spaeth-MacKnight, of New York City. This company owns two valuable groups of claims near Pioche, which has been undergoing a brief period of intensive development, during which encouraging tonnages of good grade silver milling ores have been proved available for future treatment at proposed mills, which are expected to be built at Silverhorn, where ample water and fuel are available.

Development work is in charge of W. E. Brodie, of Pioche, whose extensive leasing operations in this district have given him much valuable insight into its possibilities. Under Brodie's practical supervision the tunnel on the Great Western group at Stampede, recommended by Engineer John Carter Anderson, of Tucson, has already been advanced over 100 feet and has encountered the porphyry dike, through which this tunnel must pass before striking its objective, the big iron vein. Two shifts of miners are at work in this heading which already shows extensive mineralization, indicating that the ore may be struck with any round of holes.

Careful study of this iron vein, which has already been exposed by surface trenching for over 1,000 feet, indicates interesting possibilities at depth. High grade ore has been opened up in a number of places and samples of this rich ore assayed 312.2 ounces in silver, \$2.60 in gold and 76.6 per cent in lead content. These richer ores doubtless escaped the extreme surface leaching undergone by the big vein and are an interesting indication of what may reasonably be expected at depth.

Only incorporated within the past month the Nevada Silver Klondike Mining Company has already accomplished much constructive development work, done where mining should be done, underground.

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*Illustrated

"GEORGIE GRAYA DA RICE"

By Italian Pete Dante, a Midas, Nevada, survivor of Broken Hills, without apologies to "Peanut Pietro" or anybody else:

"Georgie Graya da Rice;
He talka so mooch verra nice—
Damn son of a gun,
He always getta da mon;
No trya worka da mine—
Shoota da jack fora da wine."

Now that the "buyers' strike," says the Mining and Oil Bulletin of Los Angeles, has shown what it could do to create business depression, why shouldn't these same buyers start a "taxpayers' strike" and let city, county, state and national politicians understand what it means to have the general buying and voting public aroused on a financial question?

The 1921-22 catalogue of the University of Utah, which has just been issued, announces fifteen courses of specific western subjects and two of these "Utah in the World War" and "Spring Flowers of the Wasatch" are even more local. In all, there are 869 courses catalogued for class work, which is an increase of fifty-six over last year; 116 of these will be duplicated by the correspondence and class work of the extension division.

NEW DAY DAWING FOR METAL MINING.

The announcement that the freight rate on crude lead bullion to the Atlantic seaboard refineries was reduced from \$22 to \$16.50 on the 11th instnt will prove most acceptable to the producers of lead and lead-silver ores in the Western mining districts, who will unquestionably receive the benefit of the reduction through the smelters who buy the ores. This gain of \$5.50 per ton, coupled with the gain in price which should result from the application of the new protective tariff of 1½c a pound, as against ¾c., should make the market price of lead bullion range about \$12.50 per ton higher than at present, which means that the miner should receive approximately \$9.00 per ton more for ore carrying 50 per cent lead than formerly. Now, if the railroads will trim down the cost of hauling ores and the smelters will "do their bit" in meeting the general reduction program that must be carried out before the metal mining industry can again swing into its old stride, the mining regions in this part of the country will indeed have cause for rejoicing.

Hundreds of lead and lead-silver properties in Utah, Nevada, Idaho, Washington, Montana, Colorado and even British Columbia, have either been closed down or greatly curtailed in operation during the past three years and many smelters have thus been forced to reduce operations almost to the vanishing point. The situation has been even worse in the copper department of the mining industry and the point has been reached where a change must come or the metal mining industry in this country must be counted out. It is gratifying, indeed, that things are beginning to shape up as they are, for it means that activity on an extensive scale will soon take the place of the stagnation which has prevailed so long and which has had such a wide-spread effect on the industrial and commercial life of the West. The crisis now seems to have been passed; the dawn of the new day in metal mining is at hand.

NEW BILL ON ASSESSMENT WORK

On the first of the present month a bill changing the period for doing annual assessment work on mining claims was passed by the house of representatives, and it is claimed in Washington that the senate will unquestionably approve the measure. The bill is in the form of an amendment to section 2324 of the Revised Statutes, and adds to that section the following:

"Provided that the period within which the work required to be done annually on all unpatented mineral claims located since May 10, 1872, including such claims in Alaska, shall commence at 12 o'clock, noon, on the first day of July succeeding the date of location of such claim; provided further that on all such valid existing claims the annual period ending December 31, 1921, shall continue to 12 o'clock, noon, July 1, 1922."

Under a special law passed last session, assessment work for the calendar year 1920 could be done any time before July 1, 1921, congress having granted a six months' extension. This session the senate passed a bill granting a further extension, but the house refused to act on that bill.

The bill just passed by the house provides in effect that assessment work for 1921 may be done any time before July 1, 1922, and thereafter the assessment year is coordinate with the government fiscal year beginning July 1. The bill does not affect assessment work for the calendar year of 1920.

ELEMENTARY PRINCIPLES OF ELECTRICITY.

The ultimate thing we know of electricity is the electron. An electron is a tiny particle which does not have any weight whatsoever, and has the peculiar property of violently repelling any other electron which comes near it, says William A. Del Mar, chief engineer of the Habershaw Electric Cable Company, in the *Wire Message*, published by that company.

Matter is composed of atoms, an average atom being about 1-200 the diameter of the smallest thing you can see with the most powerful microscope. Each atom is a miniature solar system consisting of a central sun called the nucleus and a number of planets whirling about it at a dizzy speed—the planets being electrons. These electrons are as far apart compared to their size as are the planets of the solar system. Besides these electrons there are in some instances free electrons which wander about at random like meteors in the sky. The nucleus of an atom is a charge of positive electricity. The electrons are charges of negative electricity. An electric phenomena, except some which are more strictly chemical than electrical, are produced by electrons; that is, by negative electricity.

Current of Electricity.

We have stated that, in some substances, free electrons wander about at random, between the atoms, occasionally colliding with an atom and rebounding from it. Such substances are called conductors of electricity. In other substances, the free electrons are fewer in number and are restricted in their motion. Such substances are called non-conductors or insulators.

If electrons are pumped into one end of a metal wire, the free electrons in the wire are pushed along at the rate of a few inches per minute, but they jostle the electrons ahead of them so that the electrons at the other end of the wire will be almost immediately shoved out, no matter how long the wire may be. In fact, this impulse is carried along the wire at the rate of 186,000 miles per second, or over seven times around the earth in one second.

An electric generator, be it dynamo or battery, is a device to drive or pump electrons.

A wire is virtually a pipe to carry a stream of electrons. The insulation consists of material practically impervious to electrons and corresponds to the walls of a pipe.

The stream of electrons moves through the wire from the negative to the positive pole of the generator, and through the generator from the positive to the negative pole.

Properties of Electric Current.

A stream of electrons in a wire has certain definite properties.

1. The wire becomes heated, because the stream of electrons set in motion by the generator jostles the natural electrons of the wire, both those that are free and those that form part of atoms, setting them in vibration, heat being nothing but the vibration of electrons and atoms. Such is the principle of the electric flat-iron or toaster.

A vibrating electron sets up waves in space. If the vibration is fast enough these waves stimulate the eye and constitute light, such as we obtain from an incandescent lamp. If the vibrations are not so fast, the waves are called radiant heat, the kind of heat you feel coming from a hot stove. The slowest electric waves are the Hertzian waves in wireless telegraphy. By fast or slow is meant the speed

with which waves succeed one another; not the speed at which they travel through space, as this latter speed is the same for all of them, namely, 186,000 miles per second, or $7\frac{1}{2}$ times around the earth in a second.

2. If the wire be severed and the ends of the wires put in a solution of metallic salt, the electrons trying to escape from the negative pole will attach themselves to certain atoms and groups of atoms and by a process of repulsion will be propelled across the liquid, crossing the stream in small boats, so to speak. Hence, such solutions conduct, but in a different way, from metallic wires. This is the principle of electroplating.

3. A wire wound on an iron core and carrying an electric current converts the iron core into a magnet. Such a magnet is called an electro-magnet.

Electric motors are made of groups of electro-magnets, one group being stationary and the other set on a shaft free to revolve. In the simplest kind of a motor, the stationary magnet would pull the revolving magnet until the two were as close as possible and then the rotation would stop. To keep the revolving magnet going, this dead position must be overcome, so means are adopted to demagnetize the magnet when it has reached the dead position and to magnetize the one behind it. The latter one is then drawn in turn to the dead position and the process repeated. In this way continuous rotation is obtained.

4. A magnet moved near a wire sets the electrons in the wire into motion, and if the wire forms a continuous loop, the electrons will circulate. In other words, the magnet induces an electric current.

Electric generators consist of electromagnets and coils of wire which are set in rotation in relation to one another. This motion induces current in the wires.

5. A current in a wire will turn a magnetic needle around if the wire is set parallel to the needle. The operation of certain electric measuring instruments depends on the deflection of a magnet by the current to be measured.

Electric Quantities.

Amperage—The number of electrons passing through the wire per second is called the current strength or amperage. One ampere means 6,000,000,000,000,000 electrons per second.

Voltage—The pressure with which the electrons are shoved in is called the pressure or voltage.

Watts—If you were to measure how much power you could get out of a current of compressed air, you would have to take into account both the pressure and the quantity of air flowing. So with an electric current, the power put into a device depends on both the voltage and its amperage, so we say the power or wattage is the product of the amperes and volts, or

$$\text{Watts} = \text{amperes} \times \text{volts.}$$

There is an apparent exception to this rule in certain cases to which we shall refer later.

The power in watts taken by some electric apparatus is as follows:

Incandescent lamps (usually).....	25-50 watts
Incandescent lamps (special).....	50-500 watts
Fan	50-500 watts
Quart water boiler.....	350 watts
Toaster	300 watts
Flat-iron	450 watts
Motors.....	40 watts to 1,000 kilowatts or more

(A kilowatt is 1,000 watts and is equal to about 1 1-3 horse-power.)

Ohms, Resistance—The more free electrons there are in a wire the greater the ease of conducting current. Thus copper wire has more free electrons than iron wire. Hence, the greater the number of electrons, the less is said to be its resistance in ohms. Hence the greater the cross-section of the wire the less its resistance, because there are more free electrons in a large section than in a small one.

Indeed, we measure resistance by the voltage required to push through until amperage, or

$$\text{Ohms} = \frac{\text{volts}}{\text{amperes}}$$

This is called Ohm's Law.

GEOLOGICAL WORK IN IDAHO

A lively campaign of research work and study in the mineral regions of Idaho is now being carried out in systematic fashion by the department of geology of the University of Idaho, the U. S. geological survey and the Idaho bureau of mines, working in conjunction. The work under way includes the following subjects:

Project No. 1.—The completion of the study of the ore deposits of the Heath district in Adams county, the topography and general geology of which were covered by a party under Professor D. C. Livingston last summer. This work which is in charge of Dr. F. B. Laney, head of the department of geology, University of Idaho, will include also a survey of the deposits in the neighborhood of mineral, also in Adams county.

Dr. Laney will also revisit some important points, including the Red Ledge in the Seven Devils area, in order to check very recent developments there, before undertaking the completion of a professional paper on this area, to be published by the U. S. geological survey. This publication will supplement and extend the work covered by bulletin No. 1 of the state bureau of mines and geology, entitled, "The Copper Deposits of the Seven Devils and Adjacent Districts." Dr. Laney's assistant on this trip is A. M. Piper, who will undertake to secure important photographs of the mountain scenery of Adams county, these photographs to be used in the publicity campaign for the state of Idaho which the state bureau of immigration has in charge.

Project No. 2.—A geological survey of the area adjacent to the south half of Pend d'Oreille lake, including the mining districts of Lakeview, Blacktail, Granite Creek, and other areas. This work will be in charge of Mr. Simpson of the United States geological survey, and will be under the general supervision of Dr. Laney, acting on behalf of the survey.

Project No. 3.—A reconnaissance of the ore deposits of the Sawtooth area in Blaine county. This is designed to supplement the work already done by Dr. Umpleby in that area for the United States geological survey, and the work will be done by S. M. Ballard of Placerville, who will also probably do some work in the Boise basin for the bureau during the summer.

Project No. 4.—A survey of the artesian water resources of the Snake River valley and tributary valleys. This work is in charge of O. E. Meinzer of the U. S. geological survey, who will be assisted by Harold T. Stearns. This survey will include the areas of Mud Lake, Big, Little and Lost Rivers, the Pahsimeroi valley, part of the Wood River valley, and will conclude with an investigation of the Goose Creek artesian basin in the neighborhood of Oakley, which will be covered by A. M. Piper later in the field season.

Project No. 5.—A further study of the stratigraphy in the neighborhood of Boise and Weiser, supplementing the study begun last year of the oil and gas resources of this region by

Dr. J. P. Buwalda. Dr. Buwalda's work will probably be done entirely under supervision of the U. S. geological survey without assistance from the state bureau.

Project No. 6.—The completion of an investigation of the geology and gold resources of central Idaho. This work, which is under the immediate charge of Dean Francis A. Thomson, assisted by Mr. S. M. Ballard, is practically completed, and the bulletin will be ready for publication as soon as one or two points requiring further field work have been checked over.

Project No. 7.—The topography of the Grand Canyon of the Snake river, which, while not strictly geological in character, is preliminary to any thorough or careful geological work. This covers the area immediately north of the Seven Devils quadrangle, and the work is in charge of A. J. Ogle of the U. S. geological survey. This covers both sides of the Snake river, and the work is being carried on under tri-parti-agreement between the U. S. geological survey and the state bureaus of mines and geology of Oregon and Idaho.

SALT LAKE HEADS COMPANY

OPERATING IN WESTERN NEVADA.

E. J. Roberts, E. M., formerly of Salt Lake and now of San Francisco, has recently secured an old-time silver property in the Eagle district, about twelve miles south-east of Minden, in Douglas county, Nevada. Mr. Roberts, it is reported, is the president of the Veta Grande Mining Company, which has been organized to operate the mines, said to be in the heart of the district, which was a heavy early-day producer, and which went down through the demonetization of silver in 1873.

Along the Veta Grande property the vein crops for more than 5,000 feet. It ranges in width from 20 to 300 feet and its remarkable feature is the consistent argentiferous character of the quartz, which is a felsitic dike intruding an early andesite. The veins are replacement deposits along this dike and are large masses of white sugar quartz containing silver sulphides, argentite and polybasite.

The work to date has included two crosscuts of the vein. Both of these return assays in excess of \$20 per ton across 200 feet of the vein, with an additional 40 feet of vein matter in one crosscut that ranges from \$5 to \$9 per ton. Sampling of the main drift of the footwall of the vein, at a depth of 175 feet, gave an average of \$58.70 for a distance of 70 feet. The old workings as far as restored, have proven the uninterrupted character of this ore shoot to a depth of 250 feet and for a length of 165 feet. The work now in progress is the clearing out of a lower tunnel, which will furnish an exact idea of width and values at a point 150 feet west of the workings already explored. Following this examination, and probably before the end of the present month, a main working shaft will be started while a contract crew continues the development of the ore east and west.

In the flush days of the Comstock, the "Big Four" operators are reported to have offered \$250,000 for the claims now comprising the Veta Grande Mining Company, purchased a few months ago by Mr. Roberts. The former owners wanted \$400,000 for the property, it is said, and negotiations fell through.

Whatever uncertainty attended the claims made by a long succession of owners, present facts concerning the Veta Grande workings, thoroughly substantiated by a series of engineering examinations extending over the past three months, have demonstrated, it is said, that a six figure price for the property was amply justified.

Petroleum Notes

Sinclair Consolidated Oil corporation declared the regular quarterly dividend of \$2 a share on the preferred stock payable August 31 to stock of record August 15.

Twenty thousand oil field workers in California will strike September 1 if the operators do not cancel a recent wage reduction of \$1 a day, according to telegrams sent by the oil workers to President Harding and Secretaries Hoover, Davis and Denby.

R. Nishikawa, of Tokyo, Japan was a recent visitor at the Monarch Shale Oil plant. Mr. Nishikawa, who is head chemist for a large Oriental petroleum company is making a tour of the oil fields of the country, and the Colorado and Utah shale beds.

The oil production in the Cat Creek field in Fergus county, Montana, exceeds 100,000 barrels a month. This is shown by the report for June made to the public service commission by the Elk Basin Consolidated Pipe Line company. In June the company transported 108,481.70 barrels of oil in its pipes.

Information has been received at the local offices of the Frowler Oil company, an organization of Salt Lake men which is drilling a well on the main line of the Great Northern railroad, twenty miles north of Conrad, Mont., and about thirty miles from the Canadian line, that the casing had been set to the bottom of the well and drilling resumed at a depth of 1,119 feet on July 30. Strong oil indications were encountered.

Stockholders of the Emery Oil Co. recently voted to finance and complete its well on sw $\frac{1}{4}$ of 8-25-86, Ferris field, Carbon county, Wyoming, which has been standing at 4,800 feet. It will be carried down to the Dakota, expected at 5,400 feet, which will make it the deepest well in Wyoming as far as known. Last May it was reported that the General Petroleum Corporation had contracted to complete the test but apparently this deal fell through.

Claud C. Haigler, the superintendent of the Virgin Dome Oil Co., was here the latter part of last week. Mr. Haigler reports the well cased to the bottom, 2,204 feet, and he is now cleaning it out and cementing around the casing to shut off the water. As soon as this is done drilling will be resumed. There is strong gas pressure in the well, and everybody connected with it feels much encouraged.—Washington County, Utah, News.

Recent announcement by the Producers & Refiners Corporation that it will build a refinery at Casper, Wyo., and a pipe line between the refinery and the Salt Creek field, has been followed by the commencement of actual construction at the refinery site, four miles east of Casper. A force of approximately 100 men is engaged in unloading material, grading the site for the refinery, tanks and buildings and other preliminary work. Right of way for the pipe line has been mostly acquired and surveys are being completed.

N. H. Herrick of Berkeley, Calif., representing the Standard Oil company of California, spent a number of days in De Beque recently to take note of the progress in development of the oil shale industry. Mr. Herrick made his first visit here a year ago and expects to come every year

in the interests of his company. He visited Collbran, and other oil shale centers, and has been making a tour of the shale beds of the west. Colorado shales are far the best in his opinion, being richer in oil making elements, as well as being more accessible and easier mined than those of other states.—DeBeque News.

Myton, Utah, stockholders are informed that drilling will be resumed on the Twenty Mile Oil company's well in Williams Park. The well now down twelve hundred feet will be extended 100 feet further so as to put it through the redbeds and find out if the Embar sands are underneath. After that the rig will be moved eighteen hundred feet east to the more precipitous side of the structure and a new well started, where it is believed oil sands will be encountered at five hundred feet.

A road up from Thompsons north to the Hill Creek oil fields is urged by R. S. Collett, a prominent resident of Uintah county, Utah, and also an oil operator. He has written a communication to the board of commissioners of Grand county asking for their co-operation. He agrees to place a large construction outfit on the road if Grand county will spend time and money on road work on this end. Collett points out that Thompsons is the logical distributing point for the Hill Creek section and that the building of a highway from that point would not be an excessively heavy task.

The Golden West Oil & Dev. Co. test on 25-17-22e, Black Butte structure, Fergus county, Montana, has been abandoned with the hole in the bottom of the Ellis sand after being carried through the Colorado shale and the Kootenai without obtaining commercial production. The Mid-Northern Oil Co., subsidiary of the Midwest, and the Cosmos Oil Co., were financially interested in the operation. The well is spouting water over the top of the derrick at intervals, the pressure being generated by sulphurated hydrogen gas. Last December this well was the cause of considerable excitement following a report that it had come in as a producer. The Boston-Montana well on 15-17-23, of this structure, also has water in the Kootenai. These tests apparently condemn the structure.

CONSTRUCTION NOTES

Boise City, Idaho, is going to build seven Yellowstone Highway bridges at a cost of over \$38,000.

Weiser, Idaho, contemplates the early expenditure of \$65,000 on improvements at Campbell Hot Springs.

According to a recent Washington dispatch the Haynes-Stellite company of New York has applied to the power commission for a license for a power project located on Big Creek in Lemhi county, Idaho. The project includes a diversion dam, a 400-yard conduit and a power house developing 270 horsepower. The power will be used for mining and milling purposes.

Articles of incorporation were filed by the Maple Springs Power Company. The company is organized for the purpose of dealing in electrical energy, water and land. The incorporators are M. Beauregard of Gunnison, president; L. E. Cluff of Salt Lake, vice president; H. R. Waldo of Salt Lake, secretary-treasurer, and S. M. Duggins of Gunnison and R. N. Brisco of Salt Lake. The latter two are directors.

In Nearby States

ARIZONA

The Solstice Mining and Milling Co., Tombstone, are reporting a strike of ore showing assays of 209 to 1,000 ounces of silver and \$26 in gold.

The new Copper Queen concentrator will be completed by October first, according to H. Kenyon Burch, chief engineer. Mr. Burch also stated recently that the Nacozari mill would be ready for running about the first of the year.

The mill of the Dean Mining company is now turning out a large tonnage of high grade concentrates. The saving is said to be 93%, which is extremely high, and the value of the product runs from \$300 to \$600 to the ton. This mill is one of the important milling plants of Mohave county, being economical in operation and handling a large daily tonnage.

Twenty men are now employed at the Tumco mine, eighteen miles west of Yuma. They are installing a new plant, repairing buildings and mill and are preparing to work upon the tailings dumps first. R. P. Marable of Somerton is owner of the property which has been leased to N. O. Goodnow of Seattle. A 150-ton mill is being erected.

Probably the brightest spot in the San Juan Triangle is the Barstow mine, near Red Mountain, under lease to Lundberg and associates. Concentrates assaying upwards of twenty ounces of gold per ton and with good values in silver, are being made daily. It is thought, in the event the Silverton Railway does not open its lines to Red Mountain, that the product will be hauled to Silverton for shipment to the smelter.

The big mass of exhibits in the Tom Reed-United Eastern suit, involving title to the Big Jim mine, has been shipped to Phoenix, where it will be used when that case comes before the supreme court. This case was threshed out in the superior court of this county by eminent lawyers and the court decided that the title to the Big Jim claim rested in the United Eastern. From this judgment the Tom Reed is now appealing.

COLORADO

Arthur Brown with a load of material for installing a compressor, left for the property of the Columbian Mountain and Leasing Co., at Idaho Springs, where he went to install a new compressor. It is a new seven-drill machine that is being installed, to facilitate the work Manager Bird-sall has in contemplation. They have a fine streak of ore showing at present.

General Manager Gayda of the Pulaski Mining Company, owning and operating the Brownlow mines in Mosquito Gulch, adjoining the Black Hawk property, at Alma, Colorado was a Denver visitor, recently while experimental tests on Brownlow ore were being conducted and selected machinery for equipment of a first unit of 50 tons, of a modern milling plant, to be constructed by his company. In an interview the mine manager stated that several good ore bodies have already been developed on the property.

Charles Fertig and associates of Colorado Springs have become interested in the Matters group on Boulder County hill, in the Caribou district, and now have a force of men, with Billy McKenzie as superintendent, cleaning out the

shaft and putting on a plant of permanent equipment. The machinery includes a seven-drill compressor plant, a 35 hp hoist, and a 35 hp. motor. The Matters group comprises eight claims, and former surface workings yielded ore as rich as 14 ounces gold and 256 ounces silver. Superintendent McKenzie plans to sink the shaft several hundred feet, cutting stations every 100 feet. The old Cardinal road to Caribou camp has been put in good shape by the county commissioners.

After some weeks of negotiation, official announcement is now made of the organization of the Potosi Mining Company, which has taken over the Potosi property and adjoining mines at Caribou, including the Idaho and the Silver Point on Idaho mountain, and the Virginia and Maine properties on Caribou hill. Officers of the Potosi Company are: J. A. F. Durocher-Stone of Newark, N. J., president; J. G. Clark, Boulder, vice president and general manager, and J. W. Pherson, formerly of Cripple Creek, but for the past four years a successful operator in Boulder county, as superintendent. The Potosi is a half gold, half silver mine and was one of the few paying precious metals mines operated during the wartime depression.

IDAHO

The Imperial, operating near the Hecla mine, is reported to have reached a vein for which it has been driving.

Development and exploratory work is proceeding in several parts of the Coeur d'Alene region. Not in a long time has prospecting been so active.

The Midnight Mining company, operating on property that adjoins the Morning of the Federal company, is raising and doing work on the surface.

The Bluebird mine on Pend Oreille lake has made a small shipment of ore. The gray copper in this property is said to run from 400 to 1,500 ounces in silver.

In addition to the force engaged in mill construction at the Armstead Mines, at Talache, the company has a number of men employed in the erection of a hotel and 25 at work underground.

Silver-bearing veins from which assays carrying 800 ounces in silver to the ton have been obtained are attracting unusual attention to the headwaters of the Big Creek of the St. Joe river district in the Coeur d'Alenes.

A new tunnel will be driven in the New Hope Mining Company's property, north of Osborn, in the Coeur d'Alenes, in the near future. The company has recently acquired additional claims through which the new tunnel will be driven to attain much greater depth.

The 200-foot raise between the No. 1 and No. 2 tunnels in the Pilot mine on the North Fork in the Coeur d'Alenes has been completed. A vein on this property with a pay streak next to the foot wall contains from five inches to a foot of ore exceedingly rich in both silver and gold.

Six-horse teams are hauling mill machinery to the mine of the Walton property in Camas county. G. R. Collins, general manager, says he has bought a sawmill to cut mine timbers and timber for ore chutes, and believes the company will be producing concentrates in less than 30 days. The property is near Fairfield, Idaho.

The American Commander Mining & Milling Company is installing a compressor and machinery on its property near Mullan. Everything required by a motor and drills is on the ground. Underground work has been discontinued until the installation is complete. The effort of the crew is being concentrated on outside work.

After six years of idleness, the management of the St. Louis and Idaho Mining Company intends to let a contract for a 100-foot extension of its No. 3 tunnel, which is now in 1,000 feet. It is expected this will bring the tunnel under a good showing of ore found in the upper workings. The property is on Gorge gulch near Burke.

"The Chicago-Boston Mining Company, operating near Wallace, has struck two to three feet of ore, according to report current in the district," said H. B. Kingsbury of Mullan during a recent visit to Spokane, Wash. "Much of the ore is reported clean and to have a high lead-silver content. The strike was made on the bottom level, opened within a year."

A mill of 50 tons daily capacity is being installed by the Four Metals Mining Company on its property, three miles north of Nighthawk, on the Similkameen river, and its completion is expected shortly. "The plant will be equipped with two ball mills, two jigs, five tables and a flotation machine," according to Manager King. "It is expected to produce a concentrate containing six per cent copper, 38 per cent lead and 60 ounces of silver to the ton."

A. W. McCune and A. W. McCune, Jr., of Salt Lake City, were visitors in the city last week. Mr. McCune is one of the noted mining operators of the west. Many years ago he was associated with the late Scott McDonald in the development of the California mine on Nine Mile. Later the partnership was continued in mining operations in British Columbia, which proved highly successful and through which Mr. McDonald amassed a large fortune.—Wallace Miner.

Payment for the first carload of ore shipped from the Sidney mine on Pine Creek, in the Coeur d'Alenes, showed a net value of about \$30 a ton, which means that a 50-ton car has a net value of \$1,500, according to reports received at Spokane. The ore that is being shipped is practically all taken out in the course of extending the two drifts. The showing of ore on the Sidney is one of the most remarkable that has ever been made in the district at a corresponding stage of development, and is destined to become one of the great producing mines of the district.

A bond has been taken for a reported consideration of \$80,000 on the Terrible Edith mine, two miles above Murray in the Coeur d'Alenes, by H. A. Morse, a mining engineer of San Francisco. It is a lead and zinc property that was extensively worked for a good many years previous to the war. Shipments of more than \$100,000 worth of ore have been made in past years, and the property has 3,000 feet of underground work. Mr. Morse, it is reported, will open the property with a lower tunnel.

NEVADA

The one dividend-paying mine of Ormsby county is the graphite deposit owned by Walter Chedic in Voltair district, about three miles from Carson city.

George Ryan, who has a lease on the old Monitor mines at Taylor, is shipping his first car of ore from the property, which has been idle for more than forty years. The ore will go to the U. S. Smelter at Midvale, Utah for treatment.

The final cleanup of July at the West End mill resulted in the production of 35 bars of bullion having a weight of 71,300 ounces. The shipment which was made from Tonopah on the 5th is valued at approximately \$73,400.

At the present time a crew is busy taking out several carloads of graphite for the plant at Richmond, Cal. During the year approximately ten carloads have been mined and shipped and the material converted into paint, grease compounds and boiler cleaning material.

The Highland Mary claim of Austin, one of oldest properties in the district, and owned by George Kilborn, of Reno, promises to again be on the producing list. Recently a large body of high grade silver-lead ore was uncovered. Mr. Kilborn has been developing this property for a number of years and the recent find promises to compensate for all the expenditures.

John D. Tilford, a mine owner of the Spring Valley district, arrived in Ely with 547 pounds of ore which was shipped by express to Salt Lake smelters. The ore, which was very carefully sampled and assayed before shipping, is expected to average \$1 per pound in silver and gold. The ore came from the Rex claim, which was located about two months ago by Mr. Tilford, John Krotzer and Arnold and Dick Millick.

The Deep Mines continues making fast time in sinking the big 5x17-foot shaft and a depth of 785 feet had been reached on Saturday, when A. I. D'Arcy general manager, said cutting of the station at 800 feet probably would be under way today, says the Goldfield Tribune. A set of timber has been placed in the shaft daily since June 11, with the exception of three days, two of which were July 4 and 5, when the holiday retarded work.

J. A. Spiker, general manager of the Unionville Mining Company's developments at the camp of Unionville states that the company has completed the full payment of \$63,000 on the property which was purchased from Joe Bush, a pioneer of the district. Arrangements were made to start the mill again on the 1st of August for continuous run. He says it is the plan of the company to do a lot of development work and open new orebodies and to increase the size of the mill.

FREIGHT RATES ON ORE IN NORTHWEST.

Spokane, Wash., Aug. 12.—"The Great Northern railway has announced new commodity rates on ore and concentrates from Great Northern points to the Bunker Hill smelter at Bradley, Idaho, effective August 19, which should be of great benefit to the points affected," said Frank M. Smith, smelter director of the Bunker Hill Mining & Concentrating Company.

"These are rates we have been seeking for a long while. Heretofore the rates were class rates and prohibitive. The amount of saving varies according to the class rates to the various towns and cannot be easily stated. The new rates which make possible the shipping of ore and concentrates to the Bunker Hill smelter are based on ore of \$30 value to the ton. Each increase of \$10 in value per ton up to \$100 is reflected in a 25-cent increase in freight rate.

"To Nelson, B. C., the rate is \$3.75 for \$30 ore, increasing by 25-cent jumps to \$5.50 for \$100 ore. All directly intermediate towns take the same rate. To Libby, Mont., and to Porthill, Idaho, the rate is \$3.25 minimum and \$5 maximum. Salmo, B. C., Ymir, B. C., Boundary and Republic all take rates of \$3.50 minimum to \$5.25 maximum. Troy, Mont., takes a rate of \$3 tot \$4.75, Nighthawk, \$4.95 tot \$6.70; Oroville, \$4.83 to \$6.60; Ruby, \$5 to \$6.75, and Tonasket and Okanogan each \$4.75 to \$6.50."

Trade Notes

Landes & Company, machinery dealers, 246 W. South Temple Street, Salt Lake City, have taken the local agency for the Pawling & Harnischfeger Co. line of excavating machinery.

The Mutual Coal Co., recently ordered its third Sullivan undercut coal cutting machine, as well as Sullivan drill equipment for sinking a new shaft at the company's coal mines near Rains, Utah.

The General Engineering Company of this city have started work on the construction of a 150-ton plant for the Armstead Mines, Incorporated, of Talache Idaho. Mr. Karl Bernson of the Engineering Company left for Talache on July 23rd and expects to have the mill completed by the end of the year.

C. E. Chaffin, manager of the New York office of the General Engineering Company left on July 13th for Pula-cayo, Bolivia, accompanied by Frank Woods, millwright. Mr. Chaffin will start construction work for the Engineering Company on a 100-ton pilot plant for Compania Huan-chaca de Bolivia.

The Utah Metal Company has moved from Eighth South to their new building, 1155 Hayes Ave., near Ninth South and Eleventh West. This new company produces standard babbitt metal as well as linotype, stereotype and other standard metal products at competitive prices with eastern or western products, and should have the support of metal users of this and surrounding states.

The Link-Belt Company of Chicago, Indianapolis and Philadelphia have just issued a new steel chain data book, No. 475. In this book is presented completely the heavier rugged steel chains used for power transmission, and also including elevating and conveying chains. Copies can be secured by any one interested by addressing the Link-Belt Company.

C. W. Stimpson, president of the Stimpson Equipment Co., announces that the New York offices of this going and rapidly expanding concern are permanently established in the Grand Central Palace. The New York headquarters are in charge of Frank G. Janney, vice-president of the company, and B. A. Mitchell, chief engineer, who is the inventor of the Mitchell screen and also the new gyratory crusher bearing his name.

As a specific indication that the mining industry is picking up the local branch of the Hardinge Co. announces that during July five Hardinge cylinder ball mills were sold to customers in four different states, as follows: One 6-foot diameter by 22-inch cylinder went to the Bunker Hill & Sullivan, M. & C. Co., at Kellog, Idaho; one 8-foot mill to the Armsted Mines at Talache, Idaho; one 7-foot mill to the Silver King Coalition, Park City, Utah; one 5-foot mill to the Mountain Top M. Co., Ouray, Colo., and one 4½-foot mill to Kennard & Bierce, Los Angeles, Calif. Other tentative orders have also been received.

Personal Mention

Newton L. Hall returned early in the month from a trip to Butte and other northern points.

John Dern left on the 5th for a several months' visit to Germany and scenes of his childhood days.

Joe Moss, leasing on the old Wedge gold mines at Marysvale, was in town on the first arranging for the marketing of ore.

S. F. Hunt, the well known mining geologist, was called into Beaver county on professional business for eastern clients early in the month.

Stephen Birch, president of the Kennecott Copper Co., was a Salt Lake visitor for a day last week. He left for the coast with the D. C. Jackling party on the 7th.

A. V. Taylor old-time Salt Laker, now operating in Texas oil fields, is in Salt Lake for an indefinite stay. The serious illness of Mrs. Taylor is the cause of Mr. Taylor's return to his old home town.

S. M. Soupcoff, consulting engineer for the Utah department of the American Smelting & Refining company spent three days in the Pioche district recently visiting the new camp of Silverhorn in company with J. E. Burley, mining engineer for the Marcus Daly estate interests.

Frederick W. Denton, vice-president of the Copper Mining Co., has been appointed as a member of the Board of Control of the Michigan College of Mines at Houghton. He succeeds James MacNaughton, general manager for the Calumet & Hecla Mining Co., whose term has expired.

George H. Dern recently returned from a several weeks' trip into Colorado and New Mexico, where he has been investigating the opportunities for the introduction of the Holt-Dern process of treating low-grade silver ores. He was much impressed with the opportunities possessed by the Creede, Colorado, field.

Charles W. Neff, a well-known mining man and assayer, who has been identified with western mining for many years, was in Salt Lake on the 10th between trains. Mr. Neff has been looking into the oil situation along the Colorado-Utah border and expects to return from San Francisco headquarters in the near future.

John D. Ryan, chairman of the board of directors of the Anaconda Copper Mining Company, is taking advantage of a vacation period to size up conditions in the copper country of northern Michigan and trip to the Anaconda properties in Montana, as well. He expects to be absent from New York until the middle of next month.

EUREKA UNCLE SAM ENTERS HAMBURG GROUND

Eureka, Nevada, Aug. 10.—D. States, Superintendent of the Eureka Uncle Sam announces that the tunnel on the Uncle Sam has entered the Old Hamburg ground. This is the adjoining property recently purchased by the Uncle Sam Con. Mining Company and is that portion of the old property that in early days produced nearly \$3,000,000.00. The tunnel extends across the Uncle Sam property and is now 600 feet from the portal to the Hamburg line where it enters the Hamburg ground at a depth of about 250 feet from the surface.

Just before reaching the Hamburg line the tunnel cut through several old ore channels which all carried stringers of ore and was heavily stained with iron oxides. Later these stringers will be followed in the hope that they may lead to an ore body. This will not be done, however, until the tunnel has been advanced at least 50 feet further as at that point it is expected to cut into an ore body showing on the surface and from which high assays have been had. This point also brings the face of the tunnel to about the center of the old Hamburg ore zone where the richest ore bodies were found.

With a new process hollow piles are made by spraying concrete upon cores built up of tar paper covered up with wire.

Around the State

Inspection and tests at the American Flag mine have been going on all week—with no decision as yet as to future plans. Mr. W. S. Elliott, a wealthy mining man of Nevada, is interested in the proposed bond and lease, and he has two men employed in prospecting and making tests. Mr. Elliott, with Mrs. Elliott, expects to remain in our city several weeks.—Park Record, July 29.

A bond and lease has been taken by I. C. Thoresen upon the property known as the Park City King mine, adjoining on the south the Silver King Coalition Mines company's and the Silver King Consolidated Mining company's property at the head of Thayne's canyon. Mr. Thoresen, who is United States surveyor general, recently secured this bond and lease from Robert Gorkinski and the estate of James McGregor, of which John T. Beasley is trustee and executor. Plans are being made for the development of this property consisting of four claims, the Paul Jones, the Nelson, the Farragut and the Togo.

Ore which assays \$16 in gold, 170.8 ounces silver and 33.3 per cent copper has been broken into in the Spiro tunnel of the Silver King Consolidated Mining company, according to information received at the company offices a week ago. This ore, which is known as stypylite, carries an undetermined content of lead and antimony. The gross value of its gold, silver and copper contents, on the basis of the assay, would be about \$272 per ton. After the shot which disclosed the ore, it was necessary to timber up the loose ground, so the quantity of the rich material had not yet been ascertained. The disclosure was made above the southwest end of the Iron drift, which extends to the right of the main tunnel about 13,400 feet from its portal.

Two Tintic mines—the Centennial Eureka and the Bulion Beck—which had been closed down for several months resumed underground operations early in the month. When the shutdown took place most of the mining operations at both properties were in the hands of lessees and as some of these lessees have found other employment it may be some time before new men take their places and bring production back to its normal point.

ALL SHAFT-SINKING RECORDS BROKEN

On the 8th instant, one week ago, all known records for rapid mine shaft sinking had been broken by the Walter Fitch, Jr., Contracting Co., in the Water Lily shaft of the Chief Consolidated Mining Co., at Eureka, Utah. On the date mentioned above over 312 feet of sinking had been done since the 15th day of July. With the completion of the 31-day period, ending today, the best previous world's record of 310 feet will, without doubt, be exceeded by over 100 feet. A dispatch reporting conditions of the work a week ago said: The grand average has been fourteen feet and six inches per day. Mr. Fitch used from thirty-five to thirty-eight men each twenty-four hours in the big drive. The crew consisted of eighteen machinemen, two to four timbermen, six top men, six hoist men, three shift bosses and a foreman.

Mr. Fitch gives great credit to the general foreman, John Matheson, and Henry Jarvis, foreman, for the way the work has been handled. These men have been constantly on the job since the work started.

General interest was first started in shaft-sinking records when the Walter Fitch, Jr., company succeeded in sinking the Homersville shaft 260 feet in thirty-one days and claimed a world's record. The record was then broken

in Arizona and again in South Africa. After the South African record of 310 feet in thirty-one days was established, the contest was made official by the Engineering and Mining Journal. The conditions for sinking were: It must be a vertical shaft and in a metal mine. Measurements must be sworn to at the beginning and end of work by three witnesses, one of whom must be a reputable engineer. The work may be begun at any time and must be continued for thirty-one consecutive days. The Water Lily shaft is a completed shaft, including lagging, manway and air pipes.

NEW BOOKS RECEIVED

"Concentration by Flotation," compiled and edited by T. A. Rickard; John Wiley & Sons, Inc., 432 Fourth Avenue, New York. Price, \$7; just off the press; 692 pages, 6x9 inches; illustrated, including 2 large folding plates. For sale by the Salt Lake Mining Review.

This new book will meet the requirements of the student and engineer who is seeking the best information extant on the subjects covered in the work. It is largely a compilation of technical articles dealing with the oil-flotation processes as applied to the concentration of metals and minerals in current mining practice. In its pages, besides the contributions of the author, numerous articles by specialists carrying the latest data on current practice in the principal flotation plants all over the world, will be found. As concentration by flotation is largely solving the problems which heretofore have proven such a stumbling block in the way of making possible the profitable treatment of many classes of ores which have resisted all efforts to make them yield a profit, every interested person will be glad of the opportunity which this book offers to learn about all there is to know concerning the process and its applicability to modern ore dressing.

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ARE BUILT INTO OUR EQUIPMENT

P. W. BELCHER, Mech. Eng'r.,
Sales Representative.

219 DOOLY BLOCK SALT LAKE CITY, UT.

SALT LAKE MINING STOCK QUOTATIONS

The range of the market from July 23, 1921, through August 10th, inclusive. Quotations furnished by J. A. Hogle & Co., direct wires to all leading markets, 169 So. Main St., Salt Lake City, Utah, and ground floor of Eccles Building, Ogden, Utah.

Stock.	Open.	High.	Low.	L. S.	CLOSING.		
					Bid.	Asked.	Sales
Alta Mich.						.03	
Alta Con.	.01½	.01½	.01½		.01½	.02	4,000
Alta Tiger						.00½	
Albion Cons.	.05½	.05½	.05		.05	.05½	4,065
Alta Tun.	.03½	.03½	.03	.03½	.03½	.03½	19,700
Addie.					.05		
Bullion.	.03	.03	.03		.02½	.10	20,000
Big Hill	.02	.03½	.02	.03½	.03½	.04½	10,961
Big Cot. Coal.					.02	.03	
Bing. Galena	.23½	.23½	.09½		.09½	.10	106,400
Beaver Cop.					.02		
Bay State	.09½	.10	.09½		.04	.14½	1,200
Black Metal	.02½	.02½	.02½			.04	500
Col. Rexall	.28	.28	.26		.25	.26½	9,600
Colorado Con.	.02½	.02½	.02		.01	.02½	2,600
Crown Point	.01½	.01½	.01½		.01½	.02	6,450
Cardiff	1.20	1.20	1.20		1.12½	1.20	1,600
Croff.						.02	
Daly.					1.00	2.00	
Daly West.					2.00	3.00	
Dragon.						.04	
Demijohn Con.					.00½	.01	
Emma Silver	.01	.01	.01		.00½	.01	4,000
Empire Mines	.02½	.02½	.02½		.02	.04	350
East. Prince						.00½	
Emerald					.02		
Eureka Mines	.03½	.03½	.03		.03½	.04	6,700
E. Crown Pt.	.01½	.02	.01½		.02	.02½	10,000
E. Tin. Coal.	.00½	.00½	.00½		.00½	.00½	41,000
E. Tin Con.	.09½	.09½	.09		.09½	.11	1,500
East Antelope					.00½		
Eureka Lily	.08½	.10	.08½		.09½	.09½	24,461
Eureka Bull.	.06½	.06½	.05		.05½	.06½	31,941
Galena Mns.	.01½	.01½	.01½		.01	.02	3,000
Gold Chain					.10		
Grand Cent.					.12	.27	
Great West.					.03½		
Hamburg Mns.					.00½	.01	
Howell	.05	.05½	.05		.05	.06	3,500
Home Run.					.01		
Iron Bloss.	.17	.20	.17		.15	.20	2,100
Indian Queen					.00½		
Iron King	.09	.10	.09		.08	.10	2,500
Judge M. S.					2.00	3.00	
Keystone.						.50	

Stock.	Open.	High.	Low.	L. S.	CLOSING.		
					Bid.	Asked.	Sales
Kennebec	.05	.05	.05		.04½	.06½	1,000
Lehi Tin.	.01½	.02½	.01½		.01½	.02½	8,500
Leonora	.01½	.01½	.01½		.01½	.02	5,000
Logger					.00½	.01	
Monzonite.						.05	
May Day	.01½	.01½	.01½		.01	.02	1,000
Moscow						.10	
Mich. Utah	.04	.05½	.04		.03½	.04½	54,011
New Quincy	.03½	.04½	.03½		.04	.04½	71,500
No. Standard	.02½	.03½	.01½		.03	.03½	31,500
O. K. Silver.					.01	.03	
Opohongo					.401	.03	
Old Emery						.20	
Plutus	.23	.23	.23		.21	.25	1,000
Prince Con.	.21½	.22	.20		.20½	.21	19,700
Paloma						.02	
Pioche Bristol						.02	
Price Mining.					.02½	.03	
Provo.					.02	.05	
Rico Arg.						.02	
Reeds Pk. Cons.						.01	
Rico Well.					.00½		
So. Standard	.12	.13	.12		.12½	.14	1,500
Sells.	.06	.07	.05½		.06½	.07	43,600
Syndicate.						.00½	
Sil. King Coal.	1.55	1.65	1.55		1.60	1.80	4,785
Sil. King Con.	.63	.65	.55		.60	.61	4,392
Sioux Mns.					.00½	.01	
Swansea Con.					.01		
South Hecla	.40	.40	.20½		.35	.50	2,200
Silver Shield.	.13½	.13½	.10		.09	.10	22,400
So. Iron Bloss.						.01½	
Tar Baby	.02	.02	.01		.01½	.02	27,600
Tintic Cent.	.00½	.00½	.00½		.00½	.01½	500
Tintic Stand.	2.37½	2.50	2.32½		2.30	2.35	11,280
Uncle Sam					.00½	.01	
Utah Con.					.00½	.01	
Union Chief	.02	.02	.02			.04	500
Victor Con.					.01		
Victor Min.						.03	
West Toledo	.02	.02½	.01		.00½	.01½	11,652
Walker Mng.	2.32½	2.32½	2.27½		2.20	2.30	900
Woodlawn	.10	.16	.10		.10	.11½	44,600
Yankee Con.					.00½		
Zuma.	.03	.03	.03		.02½	.04	6,000

ORE SHIPMENTS

Shipments from the Park City district for the two-week period ending on the 4th, amounted to 2968 tons of ore, as follows:

Judge Allied Companies	1,140
Ontario Silver Mines	788
Silver King Coalition	1,140

Output of the mines of the Tintic district for the two-week period ending on the 4th, which is always reported in carloads instead of tons, totalled 305 carloads, as follows:

Tintic Standard	94
Chief Consolidated	66
Iron King	28
Dragon Consolidated	17
Eagle & Blue Bell	23
Victoria	22
Iron Blossom	14
Centennial-Eureka	7
Little May	2
Swansea	6
Colorado Consolidated	5
Gemini	1
Bullion-Beck	2
Eureka Hill	3
Mammoth	4
Gold Chain	1
Sunbeam	5
Alaska	3
Eureka Mines	1
Primrose	1

ASSESSMENTS PENDING

- East Tintic Coalition, ½c a share. Delinquent August 20. Sale day September 7.
 Black Metals Mines, 1c a share. Delinquent August 8. Sales day August 30.
 Neva Mining 2 mills. Delinquent August 12. Sale day September 3.
 Syndicate Mining, 1½ mills. Delinquent August. Sale day August...
 Eureka Bullion, ½c a share. Delinquent September 3. Sale day September 24.
 Cottonwood King, ½c a share. Delinquent August 26. Sale day September 17.

METAL MARKET QUOTATIONS AUGUST 9.

Silver	99¼c
Silver, in London	.60c
Copper	11⅞-12
Lead	\$4.40
Zinc	\$4.20-\$4.25

The Homestake Mining Co., of Lead, S. D., has made a general reduction of wages of 50 cents per day, effective July 16. This makes miner's wages \$4.50 and shoveler's \$4.00 per day.

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SINGLE COPIES, 15 CENTS

Radium Mines in Wyoming

Description of the Property and Enterprise of the Lorimer Minerals Company at Lusk.

By Luther Gable.*

Any one feeling apprehension at the early exhaustion of our radium supply in America should visit the recently discovered radium deposits of the Lorimer Minerals Company at Lusk, Wyoming. A surprise indeed awaits him, for this property is without doubt a richer deposit—containing the highest percentage of $U_3 O_8$ —and in larger continuous bodies than has ever been previously known in this country.

The very unusual vehicle for carrying the uranium and radium values has been hitherto unknown in such extensive deposits and is termed uranophane. It is a crystalline quartz formation and so very hard that special machinery was necessary to crush it. It is grey, green or brown and while the uranium is intimately distributed throughout its structure, there frequently occurs thick crevice sheets of highly colored yellow uranium ore.

Mine's Location is Unique and Ideal.

The formation of the entire property is unique, rising abruptly as it does nearly three hundred feet out of the rolling plains of Wyoming. Rock outcroppings scar the face of this lone promontory from the base to its peak and legend has it that this ideal look-out was a great Indian stronghold. This fact is attested by the many arrow heads found upon it and even the stones that circled the tepees of the look-outs on top are still undisturbed. From this unusual point of vantage an almost unbelievable expanse can be viewed and during the writer's visit five different rain storms were visible at one time at different points on that great circling horizon, and each, more than a hundred miles apart; while at the same time the heat of the sun was so great where we stood as to permit us to "soft boil" an egg under a glass on a board.

From a well defined ridge passing entirely over the promontory from north to south the rock faults pitched both ways like the sides of a letter A. Irregularities clearly prove that this upheaval was distinctly volcanic and the radium-bearing deposits found throughout the fault constantly widen with depth, while the percentage of values increase also with depth. Four per cent ore abounds in great quantities and deep exposures have produced ore carrying over 50 per cent $U_3 O_8$.

There probably never was a better located mine anywhere, as the conditions are positively ideal, the property

being located on the very edge of the town of Lusk, where a considerable river and a railroad go right by the property line. All the workings for many years can be naturally drained and the slope of the hill presents ideal conditions for the mill location.

An elaborate concentrating system is being installed which, when completed, will permit this mill to turn out the highest grade of radium-bearing ore in the world. The mill itself is an excellent structure equipped with a specially built crusher, powerful engine, two large boilers and an air compressor for the operation of pneumatic drills.

Disappointment of Early-Day Prospectors.

The old pioneers' trail to the northwest passed this property and the sight of the cabin remains where many a prospector gambled and fought or stopped to contemplate this volcanic hill. Evidences of copper lead to the filing of many claims and nearly a score of holes or drifts were driven into it in search of the richer veins of copper or gold thought to exist within. One ambitious company erected an extensive mill and drove shafts and tunnels nearly 1000 feet through the solid rock, but rolled most of it over the dumps as worthless. The thick, yellow seams and green-grey quartz, meant nothing but disappointment to them.

Fortune hunters fought and died at the foot of the hill or succumbed to exertion in the high altitude in an attempt to scale the top, little dreaming that the brown grass or yellow-streaked soil covered the richest deposit of the rarest mineral in all the world—radium, suffering humanity's panacea. The very rocks upon the dumps are worth from \$500 to \$1,000 a ton, crushed.

I found E. D. Lorimer, president of the Lorimer Minerals Company, on the property, an agreeable and silent man. His two high-bred bull-dogs, "Damit" and "Brindle," constituted the most effective trespass sign the writer has ever seen.

Mr. Lorimer's laboratory is equipped with the most delicate electroscope and every facility for determining radium values. Extensive operations were under way for the employment of a double force of miners and the placing of much additional machinery, certain mining concessions having recently been granted The Radium By-Products Company of America, of which Mr. Lorimer is the principal stockholder.

Note the full set of pictures on the following page for complete elucidation of features of this remarkable property.

*President Paradox Radium Laboratories, Chicago, Ill.



(1) Lorimer Minerals Co.'s Lusk Radium Mill, showing river and railroad; (2) 5,000 tons of mine dump ore, discovered to be worth \$10,000 a carload for its radium values; (3) tunnel entrance to radium mines; (4) a "close up" of uranophane; (5) daylight working of radium mines; (6) showing how the promontory rises above the surrounding plains; (7) the one piece of uranophane on the edge of the car is worth \$150; (8) the entire constantly widening floor in this cut is uranophane.

World's Shaft-Sinking Record is Smashed.

A new world's record for rapid mine shaft sinking was established at the Water Lily shaft of the Chief Consolidated Mining company, at Tintic district, this state, on the 15th of the month. This new record was made by the Walter Fitch, Jr., Co., shaft and tunnel contractors, under the superintendency and foremanship of J. D. Matheson and H. W. Jarvis.

From the 15th day of July to the 15th of August—31 days—this vertical shaft was sunk and timbered for 427.5 feet, beginning at the 115.5-foot mark, thus exceeding the best previous record for similar work by 117.5 feet, which was made by the Crown Mines, Ltd., at Johannesburg, South Africa, during July, 1919, when 310 feet of sinking in 31 days, was "hung up" as a mark for the Walter Fitch Co., or anybody else, to shoot at.

The record just made was established by a crew of American-born miners, at an American mine, under prescribed conditions, as laid down in the rules promulgated by the Engineering & Mining Journal to govern such contests; and it is perfectly safe to predict that it will not be disturbed for a day or two—and when it is it will be just the kind of a crew that was marshaled by the Walter Fitch, Jr., Co. for the Water Lily shaft job.

The Shaft and Its Equipment.

The shaft is vertical and was down 115.5 feet at start of record run. It is divided into three compartments, 4 ft. 4 in. by 4 ft. 6 in. each; total outside dimensions of 15 ft. 6 in. by 13 ft. 9 in. The surface equipment consists of two small hoists and two compressors, this equipment being operated electrically. Hoisting was done through two compartments with 17-cubic-foot, rim-hung buckets. These buckets discharged their load on top, by means of an automatic dump, into 8-cubic-foot tram-cars. No crossheads are used, but the hoisting compartments are lined with lagging on the inside and the entire shaft is lined on the outside, 8 ft. by 8 ft. shaft timbers being used.

Character of Ground Encountered.

The first 367 feet of sinking passed through a porphyry formation which was quite favorable mucking material, but proved to be difficult drilling on account of its sticky character; about 50 feet of this was so blocky it had a tendency to slab before the timber was installed. The last 60 feet consisted of what is known in the Tintic district as white lime-shale; a moderately hard, close grained limestone.

How Sinking Operations Were Conducted.

The sinking was performed with 3 shifts with an average of 5.7 shaftmen per shift. Most of the timbering was done on day shift and the 4 o'clock shift; 2.8 shaft sets were installed per day by an average of 4.8 timbermen.

The timber was installed from a suspended steel bulkhead, which hung from the last set and made it possible to carry on the timbering and mucking or drilling operations simultaneously. An average of 72.5 buckets of muck were hoisted each shift.

It was necessary to drill 23.9 holes for each round, three rounds per day, averaging 15 1-4 pounds of 35 per cent Hercules gelatine powder per foot.

The average footage per day was 13.8 feet, making a total footage for the thirty-one-day period from July 15th to August 15th of 427.5 feet.

Wages and Bonuses Earned

There were but three changes in the entire personnel

during the thirty-one days of the record work. The men remained steadily at the work because they wanted to make the record and because of the bonus, which to the shaftmen, timbermen and shift bosses amounted to \$120 above their regular wages for the month, and to hoistmen and top men, \$60. The men were paid the regular scale of wages prevalent in the Tintic district of \$4.75 to \$5.25 to shaft men, \$5 to hoist men and \$3.75 to top men, with correspondingly higher rates to the foremen.

In promulgating rules governing shaft sinking contests and in assuming responsibility for authenticity of the record, the Engineering & Mining Journal also agreed that if a new record was made the company making it should receive a gold medal, while the members of the crew should be awarded silver medals.

Rules Likely to Apply to All Future Events.

Following the record made in South Africa it became apparent that if a set of rules could be framed that would make conditions and requirements something like uniform, future attempts at record-breaking would have a basis on which to more correctly judge of the work; and this, apparently, was the object in the Engineering & Mining Journal's decision to take the initiative in the matter. Here are the rules:

1. The footage made must involve operations in which the sinking process is carried on at the bottom of the shaft during the entire period. It is understood that this performance shall be accomplished by manual labor, with the assistance of power drills and such other mechanical appliances as are necessary.

2. Shafts must be those pertaining to, or sunk in conjunction with, metal mines, and the slope shall be steeper than 45 degrees.

3. The measurements shall include the distance sunk during any consecutive thirty-one day period, and shall be measured with a steel tape from well-established bench marks.

4. The measurements shall be made and sworn to by three witnesses, preferably the mine superintendent, the foreman in actual charge of the sinking and a reputable engineer.

5. Records coming within one foot of each other shall be considered as a tie, in order to allow for inevitable discrepancies in measuring to the irregular bottom of a shaft in process of being sunk. Therefore the committee will not consider less than 312 feet as a new record.

6. The award is to made to the crew whose reported figures, exceeding the record as stated and conforming to the conditions above mentioned, are first received at the Engineering and Mining Journal office. Telegraphic report stating the shaft, company, distance sunk and date will be accepted as reported at the time of the receipt by the Engineering and Mining Journal of such telegram, provided the rules are in due course complied with through the mails or otherwise.

Previous Shaft-Sinking Records.

Walter Fitch, Jr. company, 266 feet, August, 1916, Eureka, Utah; Crown Mines, Ltd., 279 feet, December, 1918, Johannesburg, South Africa; Crown Mines, Ltd., 310 feet, July, 1919, Johannesburg, South Africa; Van Dyke Copper company, 308 feet, Miami, Ariz., February, 1920. The new record completed August 15 by the Walter Fitch, Jr. company, 427.5 feet, at Eureka, Utah.

OLD SALT LAKE OIL ENTHUSIAST DISCUSSES FEATURES OF THE SITUATION.

"The recent disastrous drop in the price of crude petroleum and the resultant drastic curtailment of operations in most oil fields of the country is attributable absolutely to under-consumption—and not to manipulation, as is generally contended. I came direct from New York to Salt Lake, and while in the east had ample opportunity to learn the true statue of affairs." Thus spoke Mr. A. V. Taylor, one of the earliest and best boosters for the opening of Utah oil fields, when questioned by the Mining Review about two weeks ago. "It is the world-stagnation period," added Mr. Taylor, "that is responsible for the restricted petroleum products consumption and until the readjustment of world business complexities we cannot expect to witness high prices for crude oil again.

"It would be little short of a calamity for oil to be struck in qauntity in Utah right now," said Mr. Taylor. "The time is unpropitious. It will be better for the fields and those identified with them if big wells are not brought in at this time. Nobody can become enthused over a new oil well, when the product is not worth more than a dollar a barrel, as against about \$3.50 normally. I believe a few months will see a change for the better in the crude oil situation, as it affects prices and world-consumption, at least; and, as conditions change for the better interest in the Utah and all other fields will revive and oil strikes will then count for something."

Mr. Taylor is a strong advocate of the contract system of drilling oil wells. As a usual thing, he says, the outfits employed to do drilling on company account are care less of costs and results and time; whereas the contractor who undertakes to drill a well for a company or individual makes everybody "hit the ball" and do the work right. A good contractor, Mr. Taylor says, will usually complete a well in weeks that takes months to complete by drilling crews hired by a company for the purpose.

Mr. Taylor's company, the Ute Oil & Refining Co., of Texas, now has twelve producing wells and three or four more that are "on the sands," but which will not be drilled in under prevailing market conditions. He states that under the contracting system they complete wells of 2000 to 3600 feet in depth in from three to four and one-half weeks. In the same fields companies have worked for as much as nine months without completing a well, and after spending two or three times as much as the work should cost.

Mr. Taylor is confident that the southeast Utah fields are going to make good, and that strong production will be secured on a number of the structures, particularly in the San Rafael Swell and the country to the south and southwest. He does not believe that the big companies which have undertaken to test out much of that country have tried for a minute to deceive anybody or that they have purposely delayed operations. They simply have had their troubles, just as do most companies that undertake to do their own drilling; and they are not, he thinks, subject to censure.

MOVING AT THE SILVER KING COALITION.

The mill-site of the Silver King Coalition is a busy scene of activity these days, says the Park Record. The vast amount of concrete work is rapidly nearing completion and the work on the construction of the mill proper will

soon be under way. Steel for the structure is now arriving daily, and the next few weeks will see the new mill assuming shape.

But what is of far more importance even than the new modern mill soon to be adding wonderfully to the output of the Silver King Coalition, is the fact that the physical condition of the mine is as healthy and as promising as in the great property's palmy days.

In virgin territory on the 1300 level are wonderful ore showings, and recent development has opened up new ore bodies in various and many portions of the old workings of this great mine.

In the Silver Hill workings rich ore deposits have recently been uncovered. It is grey copper ore—assaying from 150 ounces silver, 34 per-cent copper, 30 per cent lead, and \$20.00 in gold, up, with increased quantity as well as quality being evidenced as development progresses.

PITY THE POOR COAL MINER.

Quite beyond popular belief is the amount of income of some of the workmen in coal mines, according to an investigation made by the Boston News Bureau. Hearing that some of the miners made as much as \$15 a day, this newspaper began to search for confirmatory data. It sought its information from a soft coal district in which non-union workmen were employed. The data relates to wages paid today, not to inflated earnings of the wartime period. At the particular company which was investigated, each man works twenty-six days a month; the company maintains a general store where living essentials can be purchased below general store prices; it also rents living quarters at from \$5 to \$10 a month; provides coal at \$1.50 per ton, a physician at a flat rate of \$1.50 per month, and hospital service at 50 cents per month—all of which are deducted from the gross earnings of the workman. These figures, together with the income of workmen are shown in the table printed below.

The figures of earnings shown below are manifestly selected and do not represent the average, but nevertheless they are actual returns. They illustrate the possibilities of financial return for maximum effort. The total debits column includes charges mentioned above and a living account at the company's store, and the balance-due-miner column shows the amount of income of workmen after all of their monthly necessary expenses have been paid:

Occupation	Gross Earnings	Total Debits	Balance Due Miner
Driller	\$572.30	\$75.50	\$496.80
Driller	487.47	79.50	407.97
Driller.	567.20	101.75	465.45
Shooter.	478.12	77.75	400.37
Shooter.	561.37	164.15	397.22
Shooter.	399.07	5.50	393.57
Machine man	415.14	27.00	388.14
Machine man.	435.36	74.00	361.36
Machine man	465.78	56.75	409.03
Loader.	316.86	30.50	286.36
Loader.	426.48	29.40	397.08
Loader.	424.84	34.00	390.84

"It will be noted that the picked underground men enumerated above are making all the way from \$12 to above \$20 a day and that the balance, after all living expenses, runs from \$3,500 to \$6,000 a year.

"Coal mining is not the most agreeable sort of occupation, but after all it has its compensations!"

GOLD DUST MILL PROVES SUCCESSFUL; TO SPEND \$100,000 IN EXPANSION.

Manager O. E. Kirkpatrick of the Lessburg Gold Dust Mining Co., was in Salmon recently with the clean-up of precipitates from the Gold Dust cyanide mill, which had just completed its initial run of 30 days by way of trial, says the Salmon City, Ida., Herald. The returns have proved so highly satisfactory, according to Mr. Kirkpatrick's account, that the company is already laying plans to increase the capacity of the plant to 50 tons per 24 hours, instead of 10 as at present.

Saves a High Percentage.

The process employed in ore treatment consists of crushing in cyanide solution to 40-mesh pulp, then agitating the pulp in the cyanide. This agitation is said to give a vast advantage in saving time, as the process is completed in one-fourth the time required by the old method, and which, of course, allows operation with only one-fourth the tank capacity.

It is said that by crushing the ore to pass through a 60-mesh screen the cyanide process would still be more hasty and thorough, but of course this would saddle an added cost upon treatment, which would probably be in excess of the added benefits. The run just completed has proved the saving of a high per cent of the values, both gold and silver. Mining men will note that the practice of crushing in solution is different.

If, as is found in many mines, the ore carries copper or lead along with the gold, cyanidation is rendered difficult because the copper or lead "fouls" the cyanide solutions, rendering it impotent in combining with the gold. By the agitation method, however, it is found that copper has less chance to crab the game, and Mr. Kirkpatrick says the quicker action of the new method renders it possible to treat ores containing a little copper.

Carries Some Silver.

Some of the Gold Dust ore contains considerable silver along with the gold, and other ore of the same property carries scarcely any silver. The precipitates sent this week have not been tested for silver, but they are known to contain a little. Wards gulch, famous for its rich placers of gold, received its auriferous deposits from the veins of the Gold Dust, and Wards gulch gold contained so much silver that it was worth only about \$14 an ounce. Yet some of the Gold Dust ores carry gold that is almost pure.

Next Step is to Enlarge.

Manager Kirkpatrick says the company has fully decided to enlarge the plant, by making it five times as large, computations showing that they can extract and treat 50 tons daily with little additional labor cost, and that the increased capacity will prove economical.

Also the plan contemplates installing electric power to avert the continual payment of \$15 a cord for wood, as it stands them today. By the advance estimate, they expect the enlarged mill and the installed power will cost them somewhere around \$100,000, and it will probably be completed by next spring.

E. W. Stifel, of Wheeling, W. Va., chief owner of the Gold Dust, lately spent a week at the works, and he went back feeling very well satisfied with his investment. He would make no talk for publication, and the owners have no stock to sell.

ROUND MOUNTAIN MINING MID- YEAR REPORT.

President Louis D. Gordon, of the Round Mountain Mining Co., under date of August 6th, makes the following interesting report on the company's Nevada operations from the beginning of the year up to July 22d:

From January 1st to July 22nd there were hydraulicked 100,000 yards of material from which cleanups of the head boxes yielded \$83,000, or 83c per yard.

Based upon results of previous years, we should recover from the final cleanup and from the cleaning of bed-rock, an amount equal to 40 per cent of the above, or \$33,000, a total of \$116,000 from 100,000 yards, or a value per yard of \$1.16.

Recent improvements in our placer practice will enable us to carry on hydraulic operations through the summer and fall months, and an additional 25,000 yards of a value equal to, if not better, than that already moved, should be hydraulicked this year.

Costs this year should be less than for 1920, but taking the 1920 costs as a basis, we have an indicated profit from placer operations of \$58,750 for the year 1921.

Our lode operations have been confined to leasing. From January 1st to July 1st forty-four shipments of bullion, ranging in value from \$150 to \$4575, were made by lessees, the value of this bullion totaling \$47,900.42, from which the company received in the form of royalty \$11,405.84.

The advisability of the leasing system now in effect seems to be justified by the following table:

Gross Bullion Sales.....	\$48,218.55	
Smelter and Insurance Charges.....	318.13	
Net Bullion Returns		\$47,900.42
Hoisting Cost	\$ 128.95	
Crushing Cost	88.10	
Milling Cost	3,020.45	
Paid Round Mt. Min. Co. for use of mill	1,094.00	
Retorting and Melting	234.00	
Transportation of Bullion	86.96	
Mining Costs	35,394.57	
Total Costs		\$40,047.03
Royalty paid Round Mt. Min. Co.....		\$11,405.84

Granting the lessees the wage scale of the district for their labor, the cost of producing \$47,900.42 was \$40,047.03, and inasmuch as the company received \$11,405.84 royalty, we made more money than we would have made on company account, unless the position is taken that the lessees would have done more work for the company than for themselves, which seems rather improbable.

The above figures would seem to justify the leasing policy until such time as large scale operations are resumed.

Since July 1st eight additional shipments of an aggregate value of \$6,949.06 have been made by lessees, from which the company will receive royalty as above.

About thirty leases are now in active operation, and the lode production from this source should continue indefinitely. Intensive prospecting and the removal of surface detritus by placer operations continue to disclose new veins, the smaller of which are leased, and the larger reserved in anticipation of resuming lode operations on company account as soon as conditions seem to justify this course.

We anticipate no large expenditures for improvements or additions, and with the increased purchasing power of gold and better operating conditions, the outlook is good.

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IS IT STRONTIUM OR NOT?

Under date of August 20th George W. Stose, "geologist in charge of strontium statistics," United States geological survey, writes the Mining Review from Washington, as follows:

"In an article in your magazine of July 30th, reference is made to a large find of strontium ore in Millard county, near Meadow. Specimens from this deposit sent to the Survey office by Mr. F. L. Byron, of Delta, through V. C. Heikes, of Salt Lake City, have been examined by a chemist of the geological survey and were found to be dense calcite and not strontium."

Well; Mr. Stose has "tossed his hat into the ring." Being absolutely neutral, the Mining Review is ready to receive any further evidence in the case that may be presented.

The miners of Tonopah struck last April rather than accept a small cut in wages. They held out for four months, and then voted to return to work at the reduced pay. Their idleness probably cost them an average of \$600 each, an amount that they would have been a long time making up, even had they won out and went back at the old pay. Striking is a profitless way of settling wage problems.

NEW ASSESSMENT LAW IS O. K.

Now that congress has passed and the president has signed the bill which changes the time for beginning and completing annual assessment work on mining claims, considerable strain has been lifted from the shoulders of those who have had to hustle hard to clean up their work for 1920. As the law now stands the assessment work for this year will not necessarily have to be completed until July 1st next year, when the new yearly assessment period begins. Thereafter the fiscal year will begin July 1st and end June 30th.

This is a change that the mining fraternity has been asking for during the past several years. It now will be possible to have the work done in good weather, even though it is held off until the last minute, as it usually is.

The convenience afforded by the passage of this bill will play an important part in the development of new mining prospects in the future because the miner will now be hustling to perform his assessment work at a time of the year when it will not be so hard to get men and also it will be in a portion of the year when he will have less trouble in persuading those who might financially help him to visit his property and decide whether they "want in" on the proposition or not.

The next thing mining men need to do is to give some thought to the proposed changes of the entire mineral code, which is now before congress and which will likely receive consideration at the winter session.

CONSTRUCTIVE CRITICISM IS SOUGHT.

Samuel S. Arentz, congressman at large from Nevada, who introduced the new mining law bill a short time ago—and which was recently printed in full in the columns of the Mining Review—says it is most desirable that the measure, if enacted into law, should be all that the best interests of the metal mining industry demands. To that end constructive criticism is invited from every person or corporation whose interests may be affected. In a letter on the subject addressed to the Mining Review Congressman Arentz says:

"It is not contended that this bill is perfect as it now stands. It is, however, the result of careful study and investigation on the part of the committee of engineers appointed by the director of the United States bureau of mines. Their integrity and sincerity are unquestioned.

"It is hoped that all who are interested in the development of the mineral resources of the Western states will give to this bill careful attention, time, and study, so that when it is presented to congress for final passage it will as nearly as possible effect the purpose for which it is designated.

"Anyone can tear down, but what we want is the structure improved in the rebuilding. We invite specific comment and constructive criticism from everyone interested in this subject. Address all communications to Representative Samuel S. Arentz, Room 179, House Office Building, Washington, D. C."

Formation of the Copper and Brass Research association, an unincorporated, voluntary nation-wide organization of the copper, brass and copper alloy interests, is announced by its president, R. L. Aggssiz, president of the Calumet & Hecla Mining Company. It is the purpose of the association to stimulate by cooperative effort, the use of copper, brass and copper alloy products.

IMPORTANT GOLD STRIKE IN WEEPAH.

Tonopah, Nev., Aug. 18.—Interest in developments at the new camp of Weepah, about 30 miles southwest of Tonopah, has been intensified during the past week by announcement of new rich discoveries in the property of the Electric Gold Mines company, which is controlled by Frank E. Horton and associates of Oakland and San Francisco.

Due to the discovery about a month ago of the fact that the bottom of an old prospect shaft about 100 feet north of the main working shaft was all in free gold ore averaging \$40 per ton, a crosscut was started out into the vein from the main shaft at a depth of 100 feet, and has now encountered this rich ore in driving a distance of 35 feet. The rock pans liberally and the indications are that the values will range from \$35 to \$50 per ton. Jack-hammer drills are being used in the development work, so that rapid progress will be made in opening it up.

Mine sampling from other parts of the underground workings have recently ranged from \$17.50 to \$29.30 per ton, and as the ore is absolutely free milling and the vein 70 feet wide, with accreted values of \$12 to \$20 per ton until the recent new discoveries were made, the importance of this new mining district, which was first brought to light by an Indian who found free gold in an outcrop, is being greatly strengthened.

In addition to the new underground showing, a new discovery has been made on surface, which is apparently a cross vein in which eight inches of high grade ore that assays several hundred dollars per ton has been opened. This ore is an oxidized quartz, and the pannings show exceedingly coarse gold, some of it being in the form of beads or wire gold. Several requests for leases have already been made, but have been rejected.

President Horton is now planning the construction of a mill at an early date, with provision for enlarging its capacity when development has progressed to a considerably larger stage.

Prospecting activities in this region are also being increased, with very encouraging results in a number of places.

SALT LAKE BUSINESS MEN FORM

HUNTINGTON BEACH OIL SYNDICATE.

A syndicate of well known Salt Lake business men have organized a syndicate with the purpose of developing prospective oil ground in the heart of the Huntington Beach field, out of Los Angeles, California. This determination has been reached following recent investigations of Ed. J. Shields, president of the Shields Stationary Co., of Salt Lake, who was instrumental in securing a long-term lease on property lying within less than 1000 feet of several large producing wells.

Mr. Shields returned from the coast about the first of the month and a couple of weeks later the following list of business men had joined in the proposed undertaking and had subscribed about \$15,000 toward the proposed fund of \$40,000 with which the ground is to be drilled: R. E. Miller, Geo. B. Lockhart, Hugo W. Druhl, Dr. R. W. Hall, Wallace G. Hunter, J. J. Taylor, Dr. H. B. Sprague, Ellis Freed, Fred Auerbach, Gordon Adams, Dr. C. F. Pinkerton and Morris Friedman.

As soon as the \$40,000 "jack-pot" has been subscribed and collected in, the contributors will organize, elect officers and proceed to business. When this was written the

expectation was that it would not take long to raise the money required and get the enterprise under way. If expectations are realized—and they are based upon the big developments that have proven the territory in close proximity—the promoters and backers of this undertaking will all be classed as "oil magnates" by the end of the year.

REPORT ON MIDWEST FIRES.

The Mountain States Inspection bureau has issued a report on the Midwest Ref. Co. fires at Casper, Wyoming, in June and July of this year. In the fire of June 17-18 one 80,000 and six 55,000-barrel tanks were involved. Oil destroyed amounted to 346,712 barrels. Value of tanks destroyed was \$250,000 and the oil at an average cost of \$1.72 was \$596,344. No insurance was carried and the tanks were entirely without protection or safeguards against fire or lightning. The company had previously contracted for a Foamite system with which all the tanks were to be equipped, but work was suspended after a part of the system had been installed. The tanks were ignited by a single lightning discharge. The second fire was on July 2 when lightning ignited a 55,000-barrel tank containing 53,500 barrels of crude naphtha. The tank was equipped with Foamite system and the fire was practically extinguished 20 minutes after mixing chambers began operation. Total loss, approximately \$6,000. The third fire was on July 12 when an 80,000-barrel tank was ignited by a direct stroke of lightning. The company salvaged 28,500 barrels by pumping. When oil pumps were shut down, water was injected into the tank with the idea of forming steam. Upper rings of the tank were white hot and intense heat set fire to sage brush 800 feet away. Violent boiling followed injection of water and flames shot hundreds of feet into the air. The fourth fire was on July 18 when one 80,000 and one 55,000-barrel tanks were ignited by lightning. The 80,000-barrel tank had 55,000 barrels left in it when fire was extinguished and 10,000 barrels had been pumped out. Tank can be cut down and saved for a 55,000-barrel capacity. The 55,000-barrel tank was still burning when the report was made.

CZISEK BUYS HOLT MINE.

A report received at Pocatello, Idaho, from Grangeville tells of the sale of the Holt mine in the Marshall Lake mining district to J. A. Czisek, of Boise, for approximately \$200,000.

The Holt mine is one of the best producers in the Marshall and Buffalo Hump district and in the early days was the greatest gold bearer in Idaho county. The property is equipped with a cyanide plant, a modern mill and is electrically lighted.

Mr. Czisek has been associated for many years with eastern interests in operating the Unity Gold Mines company of Warren. The Holt property was sold four years ago by John Fox of Grangeville to Mr. Holt for \$28,000. At the time of this transaction the property was in poor condition, having been idle since the early days of mining in the county. Mr. Holt installed new equipment.

American Smelting and Refining company has declared the regular quarterly dividend of 1 3-4 per cent on its preferred stock, payable September 1, to shareholders of record August 15. Improvement in the smelting situation in Mexico is reported by an official of the company, who is at present in the southern republic.

NEW GOLD STRIKE IN COLORADO.

A strike of free-milling gold ore has just been made on the old Nancy Smith vein on Griffith mountain, within the city limits of Georgetown, Colorado, according to the Georgetown Gazette. The lode was patented in 1873 and had an adit level about 20 feet long run in on it, when it was abandoned for the more lucrative silver lodes which were then pouring out their wealth at hundreds and in a great many cases, thousands of ounces of silver to the ton. So for forty-eight years it has lain without a blow being struck on it.

A few weeks ago David Kennedy, prospecting around, took a sample from the breast, four feet wide, which when concentrated, assayed 5.20 ozs. in gold and 4 ozs. in silver per ton. Securing an option from the owners, Maxwell & Hood, he cleaned it out, and run the drift about 10 feet where it seems to be assuming the earmarks of a bonanza. The drift is about 5 feet wide, all in ore, but the foot wall, from surface indications, may be several feet away.

The average of five feet will assay from \$8 to \$10 in gold per ton with a little silver, while picked samples run much higher. A streak on the hanging wall, from 3 to 5 inches, assays 3.60 ozs. in gold and 2.40 ozs. in silver per ton; a 14-inch streak assays 1.26 ozs. in gold and 1.50 ozs. in silver per ton. Iron pyrite concentrated 22 into 1 gave a concentrate assaying 8.80 ozs. in gold and 5.40 ozs. in silver per ton, while an average sample taken from all over and concentrated 140 to 1 gave a concentrate of free gold and oxidized iron sand which assayed 5530 ozs. in gold and 32 ozs. in silver per ton.

MILLION DOLLAR CONCERN ORGANIZES TO OPERATE IN VARIED PURSUITS.

Las Cruces, N. M., Aug. 22.—Mexican Border Land and Cattle Company with an authorized capital stock of \$1,000,000, in 10,000 shares of \$100 each, no stockholders' liabilities, has been incorporated under the laws of New Mexico to do business for a period of 50 years in this and other American states and in the republic of the United Mexican states.

The incorporators are W. H. Winters, Hill, N. M., where the principal and registered office is located; James V. Parks, Duncan, Ariz., H. K. Welch, R de B. Smith and J. C. Stanley, all of Patagonia, Ariz., and C. E. Gonzales and W. D. Buck of El Paso, Tex.

In addition to raising, breeding, buying and selling cattle and other live stock and domestic animals, and buy and sell grazing lands and water rights, the company purposes to drill, operate and maintain oil, gas and water wells, and maintain refineries, locate and develop mineral lands.

Mr. Winter says the company is amply financed, and that it is expected to devote considerable attention to mining operations in the Southwestern states as well as in Mexico.

Figures compiled by C. E. Siebenthal and A. Stoll, of the United States geological survey, department of the interior, from reports submitted by all zinc smelters which operated during the first six months of 1921 show that the production of zinc from domestic ore in that period was 100,781 short tons, and from foreign ore 1,744 tons, a total of 102,525 tons, as compared with 205,269 tons in the last half of 1920 and 258,108 tons in the first half. The stock of zinc held at smelters and in warehouse June 30 was 94,747 tons, having increased from 71,037 tons at the end of 1920 and 29,892 tons at the middle of that year.

A REAL LIFE STORY

With the selling of the Boswell mine, Josephine county, Oregon, a story teeming with what the movie people term "heart interest" has been going the rounds, and is in the main vouched for. Boswell and his son came from Montana at the invitation of an old-time friend named Anderson, who had found gold in the vicinity. Boswell staked out a claim from which he and his son took out over \$50,000 up to the time the son was drafted for war service. When the boy was leaving, the father promised he would not work the mine until the son's return. The boy was killed in France, and, true to his promise, Boswell kept the mine idle until a short time ago, when he announced that he would sell the mine for \$100,000. It was promptly purchased and the new owners in nine days took out about \$30,000 worth of gold.—The Detonator.

SILVER STATE CHEMICAL CO. ACTIVE.

Allen C. Eske, chemist and assayer, arrived, in Winnemucca, Nevada, on the 15th from Carson City to take a position with the Silver State Chemical company. Mr. Eske is an experienced man in this profession and will have charge of the present laboratory work coming in. So many samples of ores and mineral are coming in to the laboratory that L. E. Sewers, the managing chemist, is unable to attend to the business. In a short time the laboratory will be more fully equipped, and with the aid of Mr. Eske, all the work received can be handled without delay.

Good progress is being made with the construction work on the company's new plant. The roof sheeting is all on the two-story part of the building, which is 32x96 feet. The carpenters are now placing the trusses for the leaching room, which is 96x96 feet. All the walls of the building are of concrete and finished. The other additions to the plant will be started as soon as it is possible to do so.

Trade Notes

The Hercules Powder Co. announced on the 22nd a 25c per 100-lb. reduction on all Hercules high explosives.

Frank L. Mariner, who some time ago severed his connections with the Pensacola Tar and Turpentine Co., has recently become vice-president of the American Turpentine & Tar Co., of New Orleans, and will direct the affairs of the sales department.

The Dodge Sales and Engineering Co. of Mishawaka, Indiana, announce that the excavation for their new \$1,000,000 building in New York City at 49 Park Place is practically completed. The new building will occupy 165 feet on West Broadway, 50 feet on Murray street and 75 feet on Park Place. Present plans call for twelve stories but foundation and construction will permit of an additional four stories if needed.

George T. Hanson who has been the local manager of the Allis-Chalmers Manufacturing Co. for several years past has resigned his position with that company to take effect on the 15th of September, preparatory to engaging in business in this city on his account. He will devote his energies to promoting the Allis-Chalmers Company's rubber lined pump, mining and oil development and promotion. Mr. Hanson will be succeeded by E. N. Greenleaf who has been with the Allis Chalmers Manufacturing Co. for many years past. Mr. Greenleaf has many friends throughout the western states who will be pleased to learn of his much merited promotion.

Personal Mention

John A. Lenzi went into the Salmon River country, Idaho, last week on mining business.

H. E. Clement, mining engineer, has gone down into Beaver county on professional business.

G. W. Crane, geologist of the Chief Consolidated Mining Co., is making a geological study of the Silver King Consolidated at Park City.

A. S. Wright, of the Deming Mines Co., is visiting the company's properties near Nampa, Idaho, coming out from Chicago very recently.

Robert Linton, the well known New York mining engineer, is making an examination of the Three Kings company's property at Park City for Eastern shareholders.

James F. Callbreath, secretary of the American Mining Congress, was a recent visitor to Salt Lake. From here he went out to look over the Uinta Basin oil and oil-shale country.

Dr. Hugo Rettisch, reached Salt Lake last week and then went up to Alta for a few days sojourn and inspection of his mining interests there. Before returning to New York Dr. Rettisch contemplates a trip either to Zion or Glacier park.

R. B. Todd, president of the Star of the West Mining Co., operating in northern Nye county, Nevada, was a Salt Lake visitor on the 22d, on his way back from a trip to New York. The company's new mill now is in commission. The initial shipment of product sold for approximately \$140 a ton.

O. F. Riser and H. W. Merry have formed the Riser-Merry Co., with offices at 320 Dooly Bldg., for the purpose of handling machinery and supplies throughout the western states. Mr. Riser was formerly superintendent and chief engineer for the Chino Copper Co. Mr. Merry is well known in milling circles of the west.

Paul Armitage, attorney of New York City and a director of the United Verde Extension Mining company, was in Salt Lake last Wednesday on his way to Yellowstone park. Mr. Armitage visited friends among Salt Lake mining men in the forenoon and was taken to Bingham by L. S. Cates of the Utah Copper company in the afternoon.

W. S. Elliott, the well known Nevada and Utah mining operator who is deeply interested in the Ophir, Utah, camp, left for Ely last week. He stated that nothing more would probably be done out at Ophir until next spring. Recently he made an examination of a Park City proposition and, while most favorably impressed with its possibilities, finally decided not to tackle it at this time.

J. H. Galloupe passed through Salt Lake a few days ago on his way to Dillon, Montana. He stated that the oil-shale industry was running in low-gear at the present time, but the start which has been made, he was certain, could only result in the establishment of the industry on a firm and substantial basis, following a change for the better in business and financial conditions.

A. B. Wise, of the Willow Springs Oil & Gas Syndicate, has returned from a three weeks Eastern business trip. He reports that in many of the big eastern cities people are rapidly forsaking the coal barons and introducing

crude oil for fuel purposes. In this way, Mr. Wise says, they are "killing two birds with one stone"—they are jarring the teeth of the coal profiteers and reducing the smoke nuisance to a minimum.

Frederick Leon, for many years prominently identified with the United States Mining, Smelting & Refining Co., came in from New York several days ago to spend a short time renewing old acquaintances and chumming with friends of the days when Salt Lake was his home. Mr. Leon has been traveling quite extensively in Europe during the two years since he severed his connections with the United States company.

F. L. Byron, of Delta, Millard county, was in the city a few days ago. He says that prospects are seemingly bright for new railroad construction by the Union Pacific down in Millard and Iron counties. Plans were perfected, he said, for the entertainment of a big crowd of prospective colonists and investors from the East on the 27th, when a representation of Salt Lake business men, members of the Commercial club and others, would also be the guests of the hustling community of Delta and its environs.

Evan P. Clark, an old-time Park City mining and business man, who now is a prosperous ranchman and farmer at Sapington, Montana, was visiting in Salt Lake several days ago, accompanied by Mrs. Clark. Mr. Clark was superintendent of the old Jones Bonanza mine at Park City in the early eighties. Following the visit here Mr. and Mrs. Clark went out to the Park to greet and visit with old friends there. Though well over the sixty-year mark "Iv," as his intimates always knew him, is seemingly just as full of pep and genial good nature as during the early days of his manhood.

Construction Notes

According to the Georgetown, Colo., Courier, the Randolph Mining Company is preparing to build a mill at the entrance of the Empress tunnel.

It is reported that James Keeth, of Spokane, president of the O-lo-lim Copper company, has taken an option on the Deer Trail mine and will put \$15,000 into a concentrator plant and other machinery.

The Leesburg Gold Dust Mining Co., Leesburg, Idaho, which has recently completed an initial run at its new pilot mill, is so much pleased with the success attained that the early enlargement of the plant and the installation of electric power, all at an approximate cost of \$100,000, is now being figured upon. An article elsewhere in this issue gives additional information.

A. H. Cowie of Salt Lake, filed application with the state engineer for the appropriation of 20 second feet of water. It is proposed to divert the water at a point 110 feet down stream from the portal of the Wasatch mines, carrying the water through a diverting channel 13,700 feet in length to the point where it is planned to build the power plant.

The report that United States Steel corporation has purchased from Walter Bunton of Laporte, In., patent rights on process of tempering copper for \$1,000,000 and royalty of 2 cents a pound is denied by Judge Gary, who says the story is without foundation.

Around the State

A. W. Larsen, who has been identified with mining in the Tintic District for many years, has taken an option on a group of claims in the North Tintic district, known as the Tin Hill group, which lies a little distance north of the North Beck property. The option is for one year.

E. J. Edwards of Cedar City called at the Iron County Record office and made the announcement last week that he and his associates, H. J. Doolittle and P. N. Wilkinson, have just closed a deal with C. L. Edwards of Los Angeles for the sale of two valuable mining claims in Nexada, which will net them \$4,000 each.

It is reported that a big strike of high-grade silver ore has been made in the Pinto Iron Mountain district of Iron county. The Copper Zone mine was located about seven years ago by Bob Rickard and the company was financed and managed by Charles L. Richards of Logan. The property is located in the southeast portion of township 35 south, range 15 west, in what is known as Bullion canyon, about twenty-two miles south of Lund, and out from Sand Springs.

Careful plans are being made by the Commercial club committee for the entertainment of H. Foster Bain, director of the bureau of mines, on his visit to Salt Lake on September 28 and 29. On a committee of arrangements, F. W. Nixon was appointed chairman, with F. B. Cook as ex-officio chairman. The other members of the committee are W. E. D'Evelyn and George T. Hansen. It was decided that a dinner in honor of Mr. Bain should be given at 6 o'clock, September 29, at the Commercial club, and that invitations be extended to Utah mining men. At this dinner it is the wish of the committee to discuss with Mr. Bain the provisions of the new mining law recently introduced into congress by Representative Arentz, of Nevada.

At the Silver King Consolidated, Park City, Utah, the shoot of ore-bearing pyrite 13,400 feet in the Spiro tunnel has led westerly into an open fissure filled with broken fragments of quartz, pyrite and highgrade ore. The fissure gives out a large stream of water. This and the looseness of the formation makes progress slow and interferes with the determination of the trend of the ore body. There is uncertainty as to whether it continues horizontally or goes up with the fissure. The specimens from the broken-up mass are solid ore, very rich and some are large enough to fill a hat. One ton of the high-grade ore has been saved, and it is estimated that twice as much has been washed away. A 50-ton carload of the ore running as well as the samples tested would net the company better than \$13,000.

NEW USES FOR RADIO-ACTIVE ORE.

Las Cruces, N. M., Aug. 25.—Leo Rosenfeld and associates of El Paso, have entered into a contract with the Radium Company of Silver City to take entire output of radio-active ore produced in its mines in Grant county. It is expected to ship 1,000 pounds a month.

The ore, called tobernite, is said to contain a high percentage of radium and is to be used in the treatment of rheumatism, pythorea and other ailments. It is asserted that water becomes radio-active when charged with the crude ore.

The property was originally located and developed as a gold mine by Otto Forster and associates of Silver City. Dr. Louis F. Murray of Silver City is credited with discovering its curative properties. Hundreds of persons have been drinking the water and bathing in water in which the ore is placed.

Petroleum Notes

The Shirley Basin, Wyoming, test put down in the north-eastern part of Carbon county and 45 miles north of Laramie, by Harry P. Hinds, of Cheyenne, John Hay, Rock Springs banker, and associates, encountered water in the sand at around 1,700 feet and will be abandoned.

What appears to be an authentic report has reached Edmonton to the effect that the Imperial Oil company had brought in a second well on Bear island, in the Ft. Norman field, at a depth of 800 feet. Bear island lies in the Mackenzie river, off shore from the first well.

Interstate Oil Co. of Twin Falls, Idaho has leased more than 20,000 acres of land in Weld and Adams counties in northern Colorado and has let a contract for a test well to the Double Drilling Co. of Denver. Standard rig is being set up on the property. Production is expected in the Dakota stand.

The Montana Independent Pipe Line company's pipe line from the Cat Creek field to Winnet, Montana, completed early in July, is not yet running oil said to be due to the pipe buckling in several places. Some oil is being purchased and stored in the field where it has a 55,000-barrel tank. It also has a tank of same capacity at Winnet.

Early in August, about twenty families whose heads are employed by the Midwest Refining Co., moved to Casper from the Denver offices of the company. This completes the removal of the transportation and producing departments of the Midwest from Denver to Casper. The executive offices of the company will remain in Denver.

The Western Empire Oil Co., which has been making extensive preparations to drill the Coalville structure, spudded in its first well on the Robinson farm, at Coalville, on Wednesday last, a large party being on hand to celebrate the event. The company has installed one of the finest standard rigs imaginable and operations will be followed with unusual interest.

The Texas house of representatives has adopted a resolution for the appointment of a committee of senators and representatives to investigate alleged unlawful acts of oil operators. It is charged that large oil companies operating in the Mid-continent oil fields are parties to a combination in violation of the anti-trust laws of Texas to reduce and manipulate prices and to drive small independent operators out of the field.

From an oil well that was drilled in 1910 on the north side of the San Juan river, just across from the Piute reservation, there is exhibited in the state land commissioner's office a sample of oil which was obtained within sixty feet from the top of the well, the latter being 987 feet in depth. The sample was presented by A. R. Anderson, a visitor to the office. The well is on land leased by the state to J. T. Kephart, who has assigned his rights to the Paradise Oil Refining company.

The United States Bureau of Mines has just issued a pamphlet entitled "Tables for computing oil royalties under the leasing act of February 25, 1920," by R. C. Patterson and D. W. Moran. The tables have been compiled with a view to avoiding the long and tedious computation which would otherwise be required in arriving at royalty figures in connection with the operation of oil producing leases on the public lands of the United States. Copies of this pamphlet may be obtained

by addressing the Director of the Bureau of Mines, Washington, D. C.

P. E. Clawson, operating in the oil fields of Oklahoma and Texas and with headquarters in Kansas City, arrived in Salt and was met by T. C. Conley of Green River, president of the Union Oil company of Utah, which has extensive holdings in southeastern Utah. Mr. Clawson said that he would make a thorough examination of conditions here in respect to the oil possibilities, of which he had heard much in the southwest, with the intention of operating in this state if he finds the reports true.

Wyoming Oil World—Because the Ohio Oil Co. ordered some dynamite shipped from Denver to its Circle Cliffs operation in Utah, the report was circulated that oil had been discovered and the hole was going to be given a shot to make it produce. The facts are that the company has been having jobs at both the Circle Cliffs and Huntington tests for several weeks and sent the dynamite to Utah so that it might have it ready as a last resort should it not be able to recover the tools. Late reports indicate that the trouble at Circle Cliffs was caused by a dry sand running in on top of the tools. Instead of having had a showing of oil at Circle Cliffs, nothing so far has been found that has had the least resemblance to either oil or gas.

In Nearby States

ARIZONA

Etienne A. Ritter, consulting engineer of the Arizona Mossback mines, passed through Kingman on his way to his home in Denver, after several months spent at the mines. He states that the Mossback has just been connected up with electric power in anticipation of the larger machinery that is to be installed on the property.

P. R. Rice, mining engineer, is now associated with L. H. Foster, U. S. Mineral surveyor, with headquarters at Kingman. Mr. Rice holds the world record of shaft sinking, having made the record on the Van Dyke Copper property. He is now making a report for the Van Dyke people.—Kingman Miner. Mr. Rice has had his shaft-sinking record somewhat disturbed just recently.

The Tom Reed is quietly developing a big body of good ore on the 700 level from the Aztec shaft. This development is going to prove more important than expected, because it appears that the ledge is below the faulted horizon and will maintain its continuity without a break. It is a strong ledge between well-defined walls that should go to a great depth. The values in the new ledge of the Tom Reed will average around \$10—that is, so far as it is opened up. It may show better values at any time.

The sheriff's sale of the property of the Keystone Consolidated Mining Company under execution was made in Kingman, on the 16th, the purchasers being the plaintiff in the case. The sale of this property was the outcome of the various suits against the company which are designed to clear up the affairs of that corporation. Various suits have been filed against the company in the past year, but none of them cleared the way for final adjudication until the filing of the suit of C. W. Herndon, G. S. Holmes, Adam Patterson and Calvin B. Beach, the total amount being about \$30,000. Part of this amount was represented by notes to Holmes and the balance represented services.

BRITISH COLUMBIA.

It is reported the Nickel Plate mine at Hedley will be reopened this fall, adding another gold producer.

Directors of the Silversmith Mining company, elected at Sandon recently are: J. M. Harris, Sandon; J. P. McGoldrick, H. C. Lambach and F. B. Grinnell, Spokane; A. C. Burdick and T. S. McPherson, Victoria, and J. B. White of Spokane is manager.

An increase of \$203,000 in the value of old bullion received at the federal assay office in Vancouver, for the first seven months of this year is reported. The total is \$1,275,000, compared with \$1,073,000 for the first seven months last year. The increase is said to be general throughout the province but the fact that it is a 20 per cent increase is chiefly due to the reopening of the Rossland mines of the Consolidated Mining & Smelting company of Canada.

The California Mining company, owners of gold-bearing properties in B. C. will resume operations as soon as alterations in the mill are completed, according to reports at hand. The property is three miles south of Nelson and is composed of the California, Exchequer and Athabasco groups of 13 claims, or more than 650 acres. The mine is equipped with a modern mill, a cyanide plant and an air compressor, and the machinery is operated by water-power. Ore is available for immediate milling, but additional development work will be necessary to assure a continuous operation of the mill. J. H. Turner of Spokane is superintending operations.

COLORADO.

A quantity of rail, a blower and blacksmith supplies were sent up to the Atlantic tunnel, East Argentine, last week, where a number of men are employed putting the property in working condition.

A test run of a wagon load of ore from the Butler and Williams property in East Argentine, returned one ounce gold and fifteen ounces silver to the ton. The ore was shipped without sorting.

The Porter Fuel company recently reopened their mine near Hesperus after an idleness of over five months. The demand for coal during the season will regulate the number of men employed.—Silverton Standard.

The Mountain Chief and Evening Star Mines, on Tip Top Mountain, in the northern portion of Gilpin county and noted for the high grade gold ore they have produced, are again to resume operations after an idleness of over thirty years.

The Telluride Journal states that the Liberty Bell property was closed last week for an indefinite period. The mine has been considered near the point of depletion for some time. It has a fine record of profits, and is closing a long operation in an honorable manner.

There has been talk recently about starting a local sampler where a miner can sell ore in small quantity, as in previous years. At present he can ship only in carload lots. It is believed mining would be greatly stimulated if we had such a market.—Georgetown Courier.

Operations have been resumed on the Wheeling mine in East Argentine by the Palisade Copper company. Machine drills are to be used in development of the vein and in the stope where the paystreak, better than 12 inches

strong, carries grey copper and assays close to \$22 a ton in gold and silver. The force will shortly be increased.

Work is progressing rapidly on the aerial tram being constructed by the Roosevelt company at Alice, and Manager Shapiro thinks that within the next two weeks the wire will be strung and the operation of the mill resumed. They have a large body of low grade ore opened up and will start the mill on a 24-hour basis just as soon as possible.

The Ohio and Colorado smelter at Salida, Colo., has been sold to the owners of the Raleigh mine in the Salida district for a consideration of \$400,000. The majority of the stock of the Raleigh mine is owned by the Parks-Davis Drug Company of New York, which according to reports, intends operating the smelter to produce drug supplies of lead, zinc, arsenic and other by-products of ore from the Raleigh mine.

Jeffrey and Decker, who are operating the Mt. Kelso, on Mt. Kelso, above Silver Plume, and who have been doing development work up there for the past four years, driving a crosscut to cut the Mt. Kelso and National veins, have cut the Kelso vein, which is quite a large one, showing some 3 feet of good lead ore, running small in silver and gold. They expect to reach their objective, the National vein, in a week or ten days, and will then start mining proper.

The Reuville group, owned by Ernest Hoffman and B. F. Boyd, of Silverton, has been leased to John Corcoran and Ernst S. and Paul Hoffman. They have taken sufficient supplies to the mine to hold them until the Red Mountain railroad is opened for business, when additional supplies will be shipped to the property. Recent developments have established the ore bodies sought in the Reuville and the leasers are in position to begin immediate work on ore of a fine shipping grade.

The Mountain Top Mining company, in carrying out its plans of expansion, has ordered a new Hardinge mill and when it is installed the milling capacity will be double that at present. Recently, while developing north on the Agnes vein, the largest body of high grade ore the company has ever had was encountered, being from a foot to eighteen inches in width. Present conditions at the mine and mill are very encouraging to the management.—Ouray Herald.

Charles E. Havener, president of the Utah-Colorado Mining and Milling Co., which is operating in several of the western states, came up to this city the first of the week, says the Idaho Springs Gazette, and remained for several days, during which time he started four men at work on the old Bertha group, which lies inbetween the old Sun and Moon and the Frontenac. There are about twenty claims in the Bertha group, and the company has also acquired several claims up Virginia canon.

IDAHO.

Ore shipments have commenced from the Idaho Continental mine in Boundary county, to the smelter at Kellogg.

A 45-ton car of ore was shipped recently from the Monarch mine, owned by the Fidelity Mining company, in the North Fork district in the Coeur d'Alenes. The ore was recovered from a raise from the 1100-foot level about 60 feet above the tunnel.

By several deeds, recorded the receiver of the Drilling Development company has transferred the mining ground, improvements, machinery, etc., on Carmen creek, to the newly organized Utana Mining Corporation.—Salmon Herald.

The Paragon mill, near Murray, in the Coeur d'Alenes, was recently started. The company has a good showing in the old tunnel and with new development, is expected to be able to feed the mill with 50 tons a day for a continuous run. The mill is the old Black Horse plant, which the Paragon acquired and has rebuilt.

The Lookout Mountain property on Pine creek, in the Coeur d'Alenes, where an important strike of high grade ore was recently made on the 300 foot level, will have its machine drills in operation at once. The laying of 3,000 feet of pipeline to carry water for the machinery will be completed and this will insure ample water for all purposes. Assays on samples of the ore from the several shoots exposed in the six feet of the vein now opened carry 25 ounces silver, 73 per cent lead and 12 per cent copper.

Rufus Dunlap and Archie Smith, after working nearly a lifetime to develop their property sufficiently to secure capital to work it extensively, have finally succeeded and will build a bedrock flume on their placer holdings on Eagle creek in the Coeur d'Alenes. Although they have toiled along to secure this assistance, their labor has not been without its financial reward, for they are said to have taken out a good deal of gold from year to year, working the cruder methods of placer mining, and that in one year this work returned them \$10,000.

Just as workmen were about to commence work on a 2600-foot new crosscut tunnel to reach a distant vein in the property of the Majestic Mining company in the Coeur d'Alenes, a new vein was discovered at the portal of the proposed tunnel that promises to lead to the best ore found in the property, according to reports received at Spokane recently. Assays from the new vein show values in lead and silver. After following it for 100 feet it is said to have the appearance of developing into a favorable ore body with depth. The vein runs in the direction the long tunnel is to go, so that this tunnel will develop the new vein. The tunnel will give 1600 feet additional depth. The property is a mile and a half northeast of Burke.

According to reports, the Sunshine Mining company will start operations at once. The property consists of the Yankee Boy and the Yankee Girl mines, which the company has under lease and bond. They are in the Big Creek district, six miles from the Bunker Hill smelter. E. C. Tousley of Spokane, is manager. "A 2800-foot flume to supply the new plant with water will be finished in a few days," said Mr. Tousley. "We are hooked up to the line of the Washington Water Power company. The mill will be of 50-ton daily capacity. There is high-grade ore in this property, in addition to the regular grade mill ore. In one place we have 16 inches of ore that goes 265 ounces to the ton in silver. In July we shipped a carload that returned \$4,000."

Discovery of high grade silver-lead ore on the property of the Lookout Mountain Mining and Milling company, which was reported at Spokane recently, is attracting wide attention throughout the Coeur d'Alenes. The property is near Kellogg, four miles up Pine Creek from the railroad. The ore was uncovered on the 300-foot level, when the crosscut tunnel, driven about 550 feet, encountered the vein on its downward extension. The ore is in both carbonate and sulphide form, a considerable quantity showing clean galena. Sand carbonates, carrying better

than 40 per cent in lead, were first encountered, together with crystallized lead and chlorides of silver. Beneath an iron-capped cropping in the upper workings, a splendid showing of crystallized lead was developed, the ledge at the surface showing a width of 25 feet. The property is owned principally by Kellogg men. R. L. Brainard is president, William Boro, vice president and W. L. Jenney, secretary-treasurer.

NEVADA

The old Sheba mine in Star canyon, which produced millions for George Hearst and J. B. Haggin, is being reopened by leasers. From reports of the old property, much ore is yet to be found of a paying nature and development is expected to bring the once famous mine back to the dividend mark.

Fred W. Varney, manager of the Penn Starr Mining company at Cherry Creek, was in Ely on business. Mr. Varney states that the Star mine is closed down pending some changes in the equipment. The physical condition of the famous old property was never better, says Mr. Varney, and he is confident that it will not be long before the mine will again join the ranks of the producers.

The Salt Lake smelters are scouring the west with a view of aiding the movement of known large tonnages and should the railroad systems take a similarly broad businesslike view of western mining conditions the present lethargy would soon be a thing of the past. Pioche, like many other substantial districts, has the tonnage but the mine owners are weary of giving their hard earned profits to the railroads.—Pioche Record.

The Olympian Mining and Milling company of Salt Lake City, now operating at Frieberg in the extreme western part of Lincoln county, is prosecuting some important development work on its extensive property. A compressor plant is now installed and the work of driving a tunnel to tap the ore body is being pushed forward with energy. This ore body is very unique in that the outcrop is exposed high up on the mountain side, consequently this tunnel, when driven about 500 feet should tap the vein and open it up for further development at a depth of approximate 700 feet from the surface.

Recently, according to the Pioche Record, miners driving the Silver Klondike tunnel at Stampede Gap broke into an old fully timbered shaft completely filled with muck. The existence of this old workings is unknown to the old-timers in the Pioche district and future developments will be watched with keen interest. Stories have been recalled, since the discovery of the old workings, of early day trouble over rich ore discovered by a Chinaman who originally owned the property and many surmises are being made as to what will be found when the headings are cleaned out and what causes led the early-day miners to so effectually conceal the results of their labor.

The work of re-opening the Alps mine at Pioche has now reached the point where resumption of ore production will shortly be commenced. The shaft has been cleaned out and well timbered. Samplings of the ores exposed in the old workings will determine the method of future work.

J. W. Wilson, Jack Kendall, Jim Kearns and F. J. Hastings made a flying trip to the Green Creek placer near Birdgeport recently, says the Yerington Times. They report the showing continues to improve as the necessarily crude work of the locators progresses, and it seems now certain that mineralized gravel is quite extensive in area.

A large chunk of ore weighing about seventy pounds, on display in the Battle Mountain State Bank, has attracted considerable attention of late. The ore is from the Midland tunnel, on the Buckingham property, at Copper Basin. The Midland tunnel is now in 500 feet from the portal and the ledge at this point is five feet thick, of a good milling grade. Of the five feet, there are eighteen inches of the ledge that will assay better than \$100 to the ton.

Price Brothers and the Copperville mine, large shippers of high grade copper during war time, found that the crude copper contained from 3 to as high as 20 per cent cobalt for which they received no returns, and through correspondence a buyer of cobalt ore was induced to visit the Goodsprings district who investigated the possibilities of mining cobalt in the district. So far nine different properties sample up into good and high shipping grade and a number of old timers in camp are preparing to mine cobalt ore. Several small shipments have been made by mail. This ore was shipped from the Blue Jay mine. The main ores of the mine are spaerocobaltite, cobaltite and erythrite.—Las Vegas Age.

The lease on the Jennie A property at Hamilton, which was purchased about a year ago from New York parties by D. C. McDonald, Wm. Harwood and Wm. Humphrey, is being worked under the supervision of Mr. Harwood, who reports encouraging development in both drifts. A tunnel was run to intersect the vein, which strikes in a northeasterly and southwesterly direction, and drifting operations are being carried forward in both directions. The southeast drift has been extended for a distance of 35 feet and the face of the drift shows 14 feet of ore that will average 35 per cent lead and 18 ounces in silver per ton, with neither wall yet in sight. The face of the northwest drift is 30 feet wide and carries about the same values as the other drifts.

WASHINGTON.

Charles H. Moore, owner of the old Mammoth mine, six miles out of Northport, is working four men extending the tunnel to greater depth. It is reported the assay from a picked sample showed a trace of gold, 26.4 ounces in silver and 34 per cent lead. The old property has been renamed the "Northport Bunker Hill." It lies on the west side of the Columbia and a few yards from the new county road.

At the Queen mine in the Deer Trail district of Stevens county, workmen recently broke into a ledge in which there were 10 inches of ore that carried an average of 1080 ounces of silver to the ton and some of which ran as high as 1900 ounces. This property, which was a rich producer 20 years ago is now owned by the Silver Basin Mining company in which Charles Turner of Davenport and associates are the stockholders. Mr. Turner is working it with seven men.

H. M. Howard, president of the Achan Bee Silver-Lead Mining company of Spokane which owns property adjoining the Queen, in the Deer Trail district, says: "We have traced the Queen ledge across our eight claims, and find that it strikes within 60 feet of the face of our tunnel. We are getting fine ore and will have shipments ready as soon as metal prices justify them. In a few weeks we will install a compressor and other machinery and push the extension of the tunnel, which is now in 447 feet, and continue other developments.

SALT LAKE MINING STOCK QUOTATIONS

The range of the market from August 11th, 1921, through August 25th, inclusive. Quotations furnished by J. A. Hogle & Co., direct wires to all leading markets, 169 So. Main St., Salt Lake City, Utah, and ground floor of Eccles Building, Ogden, Utah.

CLOSING.								CLOSING.							
Stock.	Open.	High.	Low	L. S.	Bid.	Asked.	Sales	Stock.	Open.	High.	Low	L. S.	Bid.	Asked.	Sales
Alta Mich						.02		Judge M. S.						3.00	
Antelope Star						.02		Kennebec	.06	.06	.06	.06	.05	.07	1,000
Alta Con.					.01	.02		Lehi Tintic	.02½	.02½	.02½	.02½	.02½	.02½	14,000
Alta Tiger						.01		Lenora	.02	.03	.02	.02	.01½	.02	29,333
Albion Cons.	.05	.05	.05	.05	.05	.05½	600	Logger						.01½	
Amn. Metals						.05½		Monzonite						.01½	
Alta Tunnel	.03½	.04½	.03½	.04½	.04½	.05½	7,500	Miller Hill						.01½	
Addie						.05		May Day	.01½	.01½	.01½	.01½	.01		
Bullion	.03½	.03½	.03½	.03½	.02½	.02½	4 10,000	Mason Valley					1.12½	2.00	
Big Hill	.03½	.03½	.03½	.03½	.02½	.04	3,673	Moscow						.12	
Big Cot. Coal	.02	.02	.01½	.01½	.01½	.03	3,000	Mich.-Utah	.04	.04½	.03½	.03½	.03½	.03½	37,000
Bing. Galena	.10	.12½	.07	.07	.06½	.07½	50,100	New Quincy	.04½	.06½	.04½	.06	.05½	.06	161,40
Beaver Cop.						.01		Naildriver						.25	
Bay State	.09	.09	.07	.07		.03	600	Neva						.01½	
Black Metal					.02	.03		No. Standard	.03	.03½	.02½	.02½	.02½	.02½	9,000
Cent. Eureka					.01	.03		O. K. Silver						.01	
Cedar Talis						.01		Opohongo	.00½	.00½	.00½	.00½		.00½	1,000
Colb Rexall	.26	.26	.17½	.17½	.15½	.18	4,700	Plutus	.21	.21	.20½	.21	.20	.22	27,200
Colo. Con.	.01½	.01½	.01½	.01½	.01½	.01½	2,100	Prince Con.	.21	.23	.16	.16½	.16½	.16½	27,200
Crown Point	.02½	.02½	.02½	.02½	.01½	.02		Paloma	.01	.01	.01	.01		.02	1,000
Croff						.01		Pioche Bristol					.00½	.01½	
Cott King						.01		Prince Mng.	.03	.03	.02½	.02½		.03	2,000
Daly					1.27½	1.75		Provo	.04	.04	.04	.04	.03	.04½	2,000
Daly West					2.00			So. Standard	.12½	.15	.12½	.15	.15	.16½	639
Dragon					.03	.05		Sells	.06½	.06½	.05½	.05½	.05½	.06	24,500
Demij'n Con.						.01		Syndicate					.00½	.00½	
Emma Silver						.01	7,000	Sil. King Coal	1.60	1.75	1.60	1.70	1.65	1.70	1,150
Empire Mines					.02	.04		Sil. King Con.	.63	.84	.63	.80	.80	.88	5,409
Empire Cop.						.05		Siou Mns.						.01	
East. Prince						.01		Swansea Con.	.01½	.02	.01½	.01½			1,500
Emerald	.02	.02	.02	.02	.01	.03	1,000	South Hecla	.35	.35	.34	.34	.10	.35	500
Eureka Mns.	.03½	.04	.03½	.04	.03½	.04½	13,500	Sil. Shield	.09½	.10½	.08½	.09½	.05	.07	11,900
E. Crown Pt.	.01½	.02	.01½	.02	.02	.03	28,500	Tar Baby	.40½	.01½	.01	.01½	.01	.01½	9,500
E. Tin Coal						.01	15,000	Tintic Central					.00½	.01	
E. Tin Con.	.09½	.09½	.09	.09	.08	.10	2,000	Tintic Stand.	2.32½	2.32½	2.15	2.17½	2.17½	2.20	11,765
East Antelope						.01		Tin. Delaware						.03	
Eureka Lily	.09½	.09½	.09½	.09½	.09½	.93	18,047	Uncle Sam						.01	
Eureka Bul.	.06	.06½	.05	.05	.04½	.05	36,500	Utah Con.					.00½	.00½	
Gaena Mns.					.00½	.01		Union Chief					.00½	.02½	
Gold Chain						.01		Victor Con.						.03	
Grant Cent.						.27		Victor Mng.	.02	.03	.02	.03			5,000
Great West.						.03		Whirlwind						.01½	
Hamburg Mns.					.00½	.00½		West Toledo					.00½	.02	
Howell	.04½	.04½	.04½	.04½	.04	.04½	2,500	Walker Mng.	2.20	2.22½	2.15	2.17½	2.10	2.20	1,000
Home Run						.01		Woodlawn	.12	.15	.11½	.13½	.12	.14	15,200
Iron Blossom	.18	.20	.16	.16	.15	.20	2,800	Zuma	.03	.03½	.02	.03½	.03	.06	6,500
Indian Queen					.00½	.01									
Iron King	.10½	.10½	.10½	.10½	.07	.11	700								

ORE SHIPMENTS.

Shipments from the Park City district for the two-week period ending on the 19th, amounted to 3056 tons of ore, as follows:

Judge Allied Companies	1,123
Ontario Silver Mines	834
Silver King Coalition	1,098

Output of the mines of the Tintic district for the two-week period ending on the 19th, which is always reported in carloads instead of tons, totalled 316 carloads, as follows:

Tintic Standard	97
Chief Consolidated	72
Iron King	31
Dragon Consolidated	31
Eagle & Blue Bell	26
Victoria	24
Iron Blossom	23
Centennial-Eureka	8
Swansea	4
Colorado Consolidated	5
Gemini	5
Bullion-Beck	2
Eureka Hill	2
Mammoth	4
Gold Chain	1
Sunbeam	4
Eureka Mines	1

Shipment for the two-week period from Pioche district mines were 740 tons, as follows:

Bristol Silver Mines	640
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Hillside Lease	50
Nevada Silver Horn Company	20
Silver Dale Company	10
Freiburg Lease	20

METAL MARKET QUOTATIONS, AUGUST 25.

Silver	99¼c
Silver, in London	62½c
Copper	12½-12¼
Lead	\$4.40
Zinc	\$4.15-\$4.20

"What you doin', chile?"
 "Nothin', mammy."
 "My, but you is gettin' like yoh father."

Governor Allen of Kansas says there are 15,000 professional leaders of labor in the United States who are drawing \$60,000,000 a year out of the slender pockets of union men.

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5 one thousand pound stamps in good condition, cheap. George F. Wasson, 433 Clift Bldg., Salt Lake City.

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The Salt Lake Mining Review

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Genuine Jet Deposit in Wayne County, Utah, Of Commercial Extent and Perfect Texture

By J. C. Gustaveson*.

The undeveloped resources of Utah are so varied and of such inestimable potential value—and the Mining Review takes such commendable interest in bringing them to the attention of the world—that it is a pleasure and a privilege highly esteemed by the writer to contribute this article, descriptive of a commercial deposit of jet which I have located in what is known as Coal Basin, at the foot of the Henry mountains, in Wayne county. Covering this deposit, which occurs in a flat, coal-like vein, I own ten claims or 220 acres, in which 15,000 linear feet of the outcrop of the strata containing the jet is exposed.

In order to fully comprehend the significance of this discovery and the place it should eventually occupy in the field of Utah's pre-eminent position as Nature's depository of all the commercial, precious and semi-precious minerals, it is necessary to carry the reader through flights of time comprehended in the mysterious methods employed in Nature's laboratories.

How This Deposit of Jet Was Formed and Exposed.

Ages ago, at the time of the great uplift, the Henry mountain range punctured the wide expanse of desert in the southeastern portion of this state and reared its peaks thousands of feet in the air, throwing the formations composing the earth's crust in all directions. As a result of this action the medieval forest of trees that grew in this vicinity were destroyed and covered to a depth of at least 2,000 feet. The pressure of this tremendous overburden compressed and flattened out trees that probably were a foot or more in diameter to a thickness of four to six inches, thus squeezing out the sap and closing the pores of the wood. The heat caused by this earth pressure eventually turned these trees into a highly fossilized state, producing a mineral that the world has come to know and recognize as jet. The amount of jet in this strata equals the amount of timber that once grew on this level, with the exception that the timber now is in a compressed form and therefore somewhat less in bulk.

During the ages following the Henry mountain uplift, Nature, forever working, slowly but surely began and finally completed the process of revealing this immense deposit of jet by directing streams of water from the melting snows down the slopes of the Henry mountains across the formations that had been laid down upon this forest of trees until a deep chasm was cut in the earth's crust and which

constantly kept deepening and widening by the sloughing off of its banks until—after many thousands of years—an oblong basin was formed. The bottom of this basin, which is about 300 feet below the stratum wherein now lies the vein or deposit of jet, has left the vein exposed for about 15,000 feet around the upper and side walls of this immense amphitheatre or scored-out depression in the plain stretching out from the base of the Henry mountain range. This, briefly and crudely, outlines the physical conditions which led to the discovery of this remarkable deposit of genuine jet.

Physical Conditions Ideal for Cheap Mining.

Near Whitby, England, jet has been mined for centuries, and practically the world's supply comes from this source. But, unlike this Utah deposit, they are compelled to work it out from a hard formation with pick and shovel, making mining both slow and expensive; blasting would crack and shatter the jet and render it worthless. Besides, at Whitby, they now are mining through tunnels driven thousands of feet underground.

Our Utah deposit of jet is protected by a tough, hard fire-clay substance which overlays the jet like a blanket to a thickness, where exposed, of about six inches. The balance of the overburden is extremely soft and can readily be sluiced off by water, making it a simple matter to peel off the clay before removing the jet itself. At an elevation of approximately 600 feet above the vein or deposit of jet there is a spring of water which can be piped down to the jet deposit and utilized to wash off the overburden, while the gulch below will furnish ample dumping ground for the washed-off debris.

Quality of This Utah Jet is Established.

Considerable jet from these claims has already been cut and polished beautifully, notwithstanding that it was mined from the surface outcroppings where it has been exposed to the weather for ages and subjected to expansion and contraction caused by the extremes of summer heat and winter frosts. Still, connoisseurs of jet have informed the writer that the English jet will not take a more perfect polish.

The writer is indebted to Mr. W. T. Barrett, engineer at the Clift building, this city, for the information that the surface jet at Whitby was worthless for cutting, as it was too brittle, while from distances underground it became

*No. 444 E. South Temple St., Salt Lake City.

tough enough to be turned in a lathe. Mr. Barrett is very familiar with jet, having worked in the Whitby jet mines for years. He states that he has never seen as large specimens of jet as I have shown.

I believe we have right here in Utah the largest deposit of commercially available jet in the world, while I am informed that the English deposit is rapidly nearing exhaustion.

What is Jet, and for What is It Used?

One recognized work on geology says: "Jet is a solid, dry, inflammable, fossilized wood substance, susceptible of a high polish, glossy in its fracture which is conchoidal or undulated. It has a black velvet lustre and a specific gravity from 1.25 to 1.30. The color is pure and deep black, with sometimes a tinge of brown. The filings or dust of jet is always brown. It occurs in opaque, compact shape of trees and branches of moderate size. Like amber, it acquires a weak electricity by friction and will pick up small fragments of tissue paper after having been rubbed briskly on woolen cloth. Considerable heat is required to burn it, but it does not melt like solid bitumen. It has been found in small quantities in Galicia, Spain, and in Whittenberg in Saxony, while near Whitby, in England, it has been found in quantity sufficient to make mining of it profitable, and is known the world over as Whitby jet. It is used extensively in jewelry and for ornamental purposes, such as necklaces, bracelets, pendants, rosaries, hat trimmings, dress trimmings, fancy buttons, bead-laces and various other ornaments mounted in gold."

By some minerologists jet is considered as being an intermediate substance between bituminous wood and coal. Another authority says this of jet: "Jet is a mineral of a compact texture and velvet-black color, and is regarded as a freak of nature. It is rarely found in commercial quantities."

I have been informed that raw jet is worth from \$7 to \$20 per pound, or \$14,000 to \$40,000 per ton. I believe there is enough jet in our Wayne county, Utah, deposit to supply the demands of the world for 100 years. A truck-load of it can be hauled from the mine to the railroad in a day. Simple, comparatively inexpensive equipment is all that is required to operate the property, so we hope, in the near future, to bring the world's market for jet to Utah.

TEN STAMP MILL FOR BIG CHIEF CON.

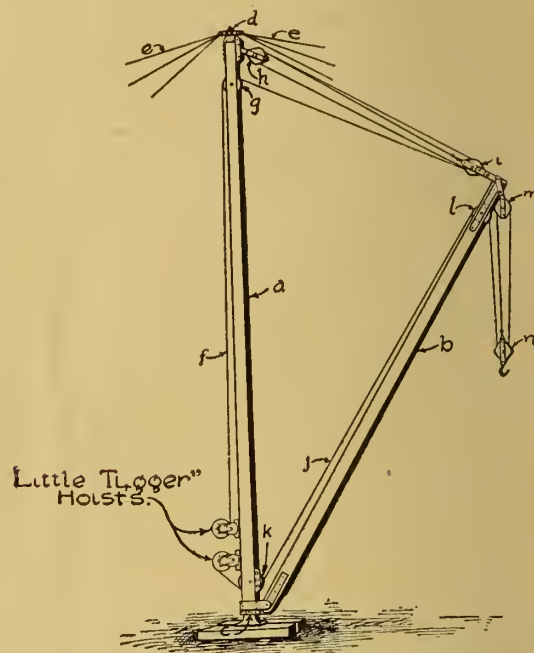
Duane Bush has returned to Winnemucca from the camp of Gold Circle, where he accompanied Clarence Berry and D. S. Ewing, who inspected the Big Chief Consolidated estate in that district. Messrs. Berry and Ewing were taken to Battle Mountain and departed for San Francisco from there.

Mr. Bush stated that it was the intention of the management of the Big Chief Consolidated to install a ten-stamp mill on the property as soon as the material for the building and the machinery can be laid on the ground. The Big Chief has a wonderful showing of ore and will be heard from when the stamps begin to drop. On their Jackson and Grant claims there are two shoots of ore opened. One of these bodies of ore is 185 feet long and the other oreshoot is 195 feet in length. On their Missing Link claim the oreshoot opened is 300 feet in length. The ore in this length on the second level will average about \$40 to the ton. On the third level the same orebody averages about \$50 to the ton.—Humboldt Star.

THE "LITTLE TUGGER" DERRICK AND HOIST

Necessity recently caused the invention of an inexpensive derrick and, at the same time showed another novel use for the "Little Tugger" hoist. When fire gutted the 600-ton mill of the Silver King Coalition Mines company at Park City early last spring, two "Little Tugger" hoists were used in the construction of a derrick for clearing away the debris to make room for the new mill now being erected. This derrick was used to lift all of the heavy material. The hoists are small, compact drum hoists operated by compressed air or steam. They were previously used in the company's mines—they were first put on the market as portable mine hoists.

Following is a description of the derrick and the work: The mast, a, and the boom, b, were both made from telegraph poles. The mast is carried at the foot by the pivot, d, held by the guy ropes, e. The boom is pivoted at the lower end of the mast. The rope, f, is connected with the



Ingersoll-Rand Co.'s Little Tugger Derrick and Hoist

upper hoist and passes over the sheave, g, at the top of the mast and through the pulley, h, at the mast head and, i, at the top of the boom. This rope varies the angle of the boom.

The hoisting rope, j, is connected with the lower hoist and passed under the sheave, k, on the mast, over sheave, l, on the boom and through the pulleys, m and n. This is the rope which suspends the load. The derrick is swung by hand, although another "Little Tugger" could do this work also if it were desired. In such case the derrick would have to be furnished with a bull-wheel.

An installation photograph taken on the ground after the fire showed the derrick in action. One-half of a No. 64½ Marcy mill had just been lifted clear of the ground. This "Little Tugger"-equipped derrick was used in clearing away about 90% of the wreckage from the fire. With the pulley arrangement shown in the sketch drawing the derrick is capable of lifting approximately a 3-ton load. This, of course, may be varied to suit conditions.

Australia is experimenting with square coins which pack better and waste less metal than round ones.

POSSIBILITIES OF UTAH OIL FIELDS AS VIEWED BY OKLAHOMAN.

By R. H. Whitney*

With the numerous tests that are being drilled in Utah for oil and gas, interest has turned to this portion of the Rocky Mountain country, and those who have looked over the state from a geological standpoint, are of the opinion that if structure means anything, Utah should be a large producer of oil and gas, as it has the largest anticlines in the country. According to report there are at the present time over thirty rigs running in the various counties, namely, Carbon, Emery, Garfield, Washington, Uinta, San Juan, Duchesne, Wayne, Grand and a number of others. Leasing it is said, continues to be active and with the government already approving better than 6,000,000 acres and permits issued to drill, the next six months should be active ones.

It has been suggested by a well known geologist that the eastern part of the state, where the most activity is centered, be divided into two districts—the Desert Region and the Uinta Basin. These two localities are said to be unusually promising for the finding of oil and gas, and this is where the majority of the work is now under way. The most activity is found in the Desert region, but considerable new development is promised for the Uinta basin, in months to come.

Uinta Basin Locality Described

In the northeastern portion of the state is located what has been termed the Uinta Basin, bounded on the north by the Uinta mountains, on the west by the Wasatch and on the south by the Book Cliffs. To the east it extends into Colorado and its limits reach practically to the continental divide. Production in the basin is expected to be found in the Tertiary, where the California production is found. This formation can be found on the surface and huge reefs of sand are exposed at various points in the mountains and if the sand can be found in structures that are favorable for the accumulations of oil or gas, production may be developed.

It is believed by some that the underlying sands, which are productive in other western states, will be found too deep in Utah to permit of profitable drilling. But that is for the future to determine.

On what is known as the Cline dome, near Duchesne, in Uinta county, the Matador Petroleum Co. (Royal Dutch) has approximately 20,000 acres under lease. This company has the choice acreage located on this anticline and has made a contract with the Ute Petroleum Co. to take over a portion of the Matador acreage and make a test. Max Ball, formerly interested in the Matador company, is in charge of operations for the new concern and it is likely that work will be started soon.

The only wildcat test drilling in the basin at the present time is near old Fort Duchesne, by the Uinta Oil & Exploration Co., 40 miles east of Duchesne. At present operations are at a standstill and the company is being re-financed. There have been some reports of oil shale deposits in the basin, with reference to the Hill Creek locality, 50 miles south of Fort Duchesne, and the Hill Creek Oil & Refining Co. is making preparations to test this out.

Desert Region is Large.

The most interest seems to be centered in the Desert Region, which is located on a broad dissected plateau ex-

tending from the Book Cliffs on the north into northern Arizona on the south and Wasatch mountains on the west and into western Colorado. This is a very sparsely settled country and served only by a railroad in the northern part. This is a vast area and covers territory 300 miles north and south and 200 miles east and west. This is the largest known structure in the country favorable for the developing of oil and gas, and while the area does not contain as many structures as adjoining states, they are larger and if productive should show wells of longer life.

This mammoth anticline consists of an uplift extending from the Book Cliffs to Pink Cliffs, the general direction being in a northeasterly and southwesterly trend. It embraces the San Rafael Swell, Cainville, Circle Cliffs and other structures of lesser character, and within one or more of these domes it is expected some good producing oil wells will be found.

The largest of the individual anticlines on this general structure is the San Rafael Swell, located entirely in Emery county and in the southern portion of that district. It covers an area 75 miles in length and 30 miles in width, with the main axis running northeast and southwest. It is expected that many sands will be found within this structure, though some possibly, will be barren. There are some spots on the Swell that should be productive, but it will require time and money to locate them. This is one huge dome with a gentle slope to the northwest and a steeper incline to the southwest. It is surrounded by high cliffs, which make other similar structures in that country look like mere bumps on the earth. In this area the Tertiary is seldom in evidence, and in places the Cretaceous formation has been eroded away.

Another structure called Cainville is located midway between the San Rafael Swell and Circle Cliffs. Its main axis runs to the northwest and southeast. It is oval in shape, and is 10 miles in length and from seven to eight miles in width. The Circle Cliffs dome is 30 miles long and 10 miles wide and its main axis runs true to the old 45 degree-northeast and southwest trend. This is the old degree line that the Pennsylvania operators followed so closely during the developments in that state.

Other structures are to be found in the general region, namely Lost Chance, Ferron, also known as Salt Wash, Rochester, Castledale, Huntington and Farnham. All are located along the west side of the region and north or a little east of north of the San Rafael Swell. Almost due east of the Swell, in Grand county, is the Moab structure and southeast of the Swell, is Nequoa, which rivals the Circle Cliffs anticline in size.

Formations That Are Possible.

There are several formations scattered throughout the state that may be productive after the different structures are tested. Among the most probable for the developing of oil or gas are the Cretaceous, Dakota sandstone, Permian, Carboniferous, Jurassic, Triassic, Ferron, and other formations that correspond to those found in the Pennsylvania series. In the eastern portion of the state various formations are possible, not all the structures having a chance to get the same formation.

On the Huntington, Crescent and Castledale domes, the Cretaceous is being tested, in hopes of getting production in the Ferron or Dakota sandstone series. At Castledale the Ferron is near the surface and the hope of anything above the Dakota does not look feasible. At Cainville, Woodside and Summerville, the tests will possibly be to the Jurassic, Triassic and Permo-Carboniferous and possibly to the upper strata of the Pennsylvania series. The Cainville

*412 Mays Building, Tulsa, Oklahoma.

structure is directly between the Circle Cliff structure, in Garfield county, and the San Rafael Swell, and is one of the most favorable localities for the developing of a new pool.

On the Farnham anticline, the object is the Shinarump, while on the Ferron dome, the Ferron sand is looked upon favorably. In all the other localities it is thought that the production will be found in the Permo-Carboniferous, or Pennsylvania series.

Where exposed in Utah, the Ferron shows no saturation and the accumulated saturations found in the Dakota exposures, appear to be due to migration as a result of faulting. In the southeastern portion the water courses have cut deep canyons in the formations and the exposures of saturated sands and many oil seeps have been found in various sections. What is known as the salt member, or the base member of the McElmo, shows occasional saturations in the Todilto (Jurassic). Although missing in many sections the Shinarump conglomerate (Triassic), however, seems to be uniformly saturated, but the thick and heavy saturated sands that have been exposed are in lower formations and are placed in the Permo-Carboniferous and Pennsylvania series.

The actual measurements of three sands by geologists and engineers, indicate that one saturated stratum showed in excess of 100 feet of sand; another 20 and 25 feet and several others from 5 to 15 feet in thickness. With the work underway on the different structures, the various formations should have a fairly good testing before the passing of many more months.

NEW BOOKS RECEIVED

The Metallurgy of the Common Metals (Fifth edition, revised and enlarged) by Leonard S. Austin, formerly Professor of Metallurgy and Ore Dressing, Michigan College of Mines: John Wiley & Sons, Inc., New York. Price, \$7. For sale by Salt Lake Mining Review.

This edition of Professor Austin's work, always a recognized authority on the subjects treated, is just off the press and is the last word in the practical metallurgy and mechanical treatment of all classes of metalliferous ores mined in this country. In his preface to this edition the author tersely says: "Since 1913, the date of the last edition, such radical changes and improvements have been made in the metallurgy of the common metals, that this edition of 1921 has been largely rewritten to bring it in accord with present practice. Great pains have been taken to clearly set forth underlying principles and at the same time to give the details of methods and of metallurgical equipment, and their cost. * * * Little attempt has been made to describe methods not now in use." The current edition is most profusely illustrated with half tones, diagrams, charts, etc., and present-day practices and methods of obtaining the best yields of metals from the ores is described in such detail and in such simple descriptive that the work can not fail of being of inestimable value to anyone having to do with the treatment of ores. The divisions devoted to gold, silver and lead ore treatment are alone worth more than the cost of the book. The engineer, millman, smelterman and the operator studying methods of best treating mine product, will each find this book a material aid in solving their problems. The mining and metallurgical engineering student will find its pages brimming full of practical information that will carry him along in his studies at a greatly accelerated pace,

APPROACHING CONVENTION OF AMERICAN MINING CONGRESS

As outlined in the September issue of the Mining Congress Journal, the purpose of the twenty-fourth annual convention of the American Mining Congress, which is to be held in Chicago, Oct. 17-22, is to plan for prosperity for the mining industries. No single mine operator, no isolated division of the mining industry can in itself effectively attempt to solve the tremendous economic problems which confront the mining industry. Collective thought and co-operative effort are essential, and this convention of the American Mining Congress will bring together the influential representatives of the industry in order to work out plans and policies for concerted action.

In arranging for the convention program the effort has been made to bring out in the general sessions of the convention the vital issues which confront mine operators and to carry on in the conferences and group discussions the development of these issues in such a way that the convention as a whole in its closing session can formulate and endorse a platform which will be of national benefit, both to the mining industries and to the public.

Among the important and vital subjects which will be discussed in Chicago is the topic, "The Railroad and the Mining Industries," to the consideration of which an entire session will be devoted.

Transportation costs and the relationship of transportation to all of the basic mining industries is one of the significant problems which confront the mine operator. The Association of Railway Executives will be represented by a nationally known railroad leader at the convention in Chicago to present the point of view of the railroads in connection with the industrial problems confronting the nation. This address will be followed by a presentation of the point of view of the mining industry in connection with transportation from the standpoint of the various divisions of mining, including metal mining and the coal industry.

Another important session will be devoted to the question of "Co-operative Effort in the Mining Industry and governmental interference." It is generally recognized that co-operative effort in the development of the mining industry is one of the most effective means for preventing wasteful production and in developing continuity of production and distribution of mine products. At the present time efforts to secure co-operation and to develop a consolidation of activities in order to prevent such wasteful methods and to stabilize industrial conditions are subject to the question of governmental interference. The question will be raised at the Chicago convention as to the possibility of developing a movement endorsed by all branches of the mining industry. This is a question of vital significance to mining and all other business enterprises. It will be presented from all points of view in Chicago. There will be an open discussion and it is hoped that as a result of these sessions a policy will be formulated which will be of benefit to all business enterprises.

A third general session will be devoted to the important question of "International Developments and Their Relation to the Domestic Mining Industry." American business at the present time is realizing as never before the importance of international relations as a direct factor in connection with business developments here in the United States. This is a question which has more than one side, and in the discussion of this topic there are many points of view. At the convention of the American Mining Congress an effort will be made to present fully the different aspects of this subject.

NEVADA MINING REVIVAL IS BECOMING MORE PRONOUNCED

By Al H. Martin.

Speeded by a succession of rich ore developments the long-awaited mining revival is rapidly becoming an accomplished fact in Nevada. For the moment interest centers at Virginia City, Goldfield and Tonopah, with Tuscarora, Reservation, Divide and several other districts promising to stage resumption of heavy production in the near future. The new era of mining in Nevada is based on comprehensive and legitimate mine developments, and not on spectacular market quotations. Capital is again pouring into the mineral fields and the greatest era of activity since the halcyon days of Goldfield is predicted for the coming fall and winter months by conservative operators.

The world-famous Comstock Lode is claiming wide attention at present, the result of several rich strikes and extension of the mineralized areas. In the noted old Consolidated Virginia, most spectacular producer of the Comstock Lode region, a huge vein of commercial ore has been opened in a raise above the 2200-foot level. At this time the ledge is 25 to 30 feet wide, has been exposed for over 40 feet and averages from \$25 to \$35 per ton in silver and gold. It was uncovered in a virgin area of the mine adjacent to ground which has yielded millions in bonanza ore.

In the Comstock-Florida, three miles southwest of the Imperial mine of the United Comstock group, a huge vein sampling \$12 to \$55 per ton, and averaging around \$20, has been uncovered in the main Florida ledge, which in places attains a width of 200 feet. Gold largely predominates. The vein was tapped by a 200-foot northerly drift from the 500-foot cross-cut tunnel and has been exposed for 30 feet. It was cut at a depth of 150 feet and the discovery is stated by the management to extend the Comstock Lode vein-system three miles to the southwest. No. 2 tunnel, in 170 feet, is designed to intersect the orebody at a depth of 400 feet. General Manager G. S. Clark is preparing for early shipments to a mill controlled by the company.

Under supervision of Albert Burch and F. R. McInnis sampling of the Middle Mines group on the Comstock Lode is proceeding on behalf of the Premo Chemical Co., of New York and Philadelphia. The group includes the Hale & Norcross, Gould & Curry, Best & Belcher, Savage, Chollar, Potosi and other properties. The United Comstock company is rushing work with 250 men on its mines at Gold Hill and the surface buildings. Construction of the first unit of the 2000-ton mill is scheduled to start in a few weeks.

Mining is increasing steadily at Goldfield and tributary points with late developments exceptionally encouraging. The Silver Pick company reports a nine-foot vein of \$60 ore in its lease on the Red Top mine, one of the properties comprising the Goldfield Consolidated. Three cars of ore are being shipped weekly to Tonopah mills.

Goldfield Developments and Yellow Tiger companies report steadily improving conditions with the Development management opening splendid ore in its Gold Hill mine. It is probable that construction of a mill at this property will be undertaken in 1922.

The shaft of the Goldfield Deep Mines has passed the 940-foot point and is scheduled to reach the 1000-level by the middle of September.

Remarkable ore developments in the Paddy Pride mine, at Shoshone, promises to make the property a worthy rival of the famous Tecopa Consolidated, which has produced millions and paid enormous profits. The drift from the intermediate level above the lower level has broken into the orebody and exposed a wide shoot of high-grade ore in addition to more than eight

feet of excellent concentrating product. The company is shipping regularly to Utah plants, the product averaging better than \$100 per ton in silver, lead and gold, but so much ore is being broken that arrangements are being made to improve shipping facilities and increase production. Superintendent Patrick Miles reports ore developments are surpassing expectations with an immense tonnage demonstrated and the mine steadily improving as depth is attained. To date more than \$400,000 in shipping ore has been blocked out, together with a huge reserve of concentrating material.

Oil continues to hold much interest throughout Nevada with the Fallon, Fish Lake and Illipah fields claiming greatest interest. Five wells at Fallon have passed the 1100-foot point and three companies, the Pioneer, Diamond and Union, are in promising oil sands. Keen interest attaches to activities of the Fish Lake Merger Oil company, which has drilled a depth of 650 feet and struck black oil. The company is using a powerful standard rig and has been forced to case its well all the way because of heavy flows of water in the ancient lake bed. This formation appears to have been passed through and drilling is now proceeding in more solid ground. Considerable gas and some petroleum have been encountered and the management is sanguine that a commercial well will be developed within 300 to 500 feet more.

EUREKA-OPHIR MINE AT OPHIR IS REOPENED BY THE COMPANY

Following years of inactivity, other than that embraced in the operations of leasers at various times, the management of the Eureka-Ophir Consolidated, with valuable property at the head of Dry canyon, in the Ophir district, Tooele county, Utah, announces that the mine has been reopened on company account and that a vigorous campaign of mining and new development work is to be carried out.

While in Salt Lake about the first of the month General Manager J. W. Cairns stated that all of the buildings on the property had been completely repaired, a 25 h. p. gasoline hoist and a compressor had been installed and that everything was in tip-top shape for making the fur fly during the fall and winter. The Eureka-Ophir is a 300,000-share corporation. Mr. Cairns is president and H. P. Stone, of Warren, Pa., is secretary-treasurer; these two officials owning the great majority of issued stock.

"We reached the conclusion several months ago," said Manager Cairns, "that it was time to clean up the mine and bring it into a producing condition again. The mine is opened by shaft to a depth of 400 feet. From that level up it has produced over \$175,000, while leasers have paid royalties approximating \$11,000. It has never been necessary, in the history of the property, to levy an assessment. During the past several years it has been impossible for me to give the property my individual, close attention; but now conditions are such that I can look after it and that is what I am going to do. After cleaning out the drifts and stopes so that it is possible to again begin production, I expect to sink the shaft deeper and open up the ore bodies below the 400, where the vein is ten feet thick and the commercial ore streak averages four feet. The shipping ore runs about 82 oz. silver, around 22% copper, with small amounts of lead and gold."

Manager Cairns is thoroughly versed in the geology and minerology and other characteristics of the mine and the district in which it is located and has no doubt of his ability to make it highly productive again within a short time. The property adjoins the famous old Hidden Treasure bonanza of early days.

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NEW MINING LAW AND NEVADA POLITICS.

They are beginning to take "pot shots" at the proposed new mining laws over in Nevada. Since the introduction of the measure in the house by Congressman Samuel S. Arentz, who has admitted that the bill in its present form will not prove what is wanted, and who has recently invited "constructive criticism" of its provisions, the mining press of Nevada has been wading into the measure with sleeves rolled up. At the same time a warning is being given Congressman Arentz, who is said to aspire to the senatorial toga now worn by Key Pittman—and the fight for which will be settled in the next general election in Nevada—that the attitude toward the new mining bill on the part of contestants will have much to do with the success or failure of those who throw their hats into the senatorial arena when the campaign opens.

After discussing some of the features of the new mining bill, the editor of the Western Nevada Miner injects Nevada state politics into the discussion in his rough-and-ready style as follows:

We very much fear that the Honorable Sam, in introducing and fathering this bill has allowed his technical and theoretical knowledge to submerge his common horse sense as a mining man, and our suggestion would be that he turn the child over to a foundling asylum. If he will get down to earth he will learn that while the bill is "sired" by himself and the wise guys of the technical society it is "damed" by every prospector who roams the deserts and mountains. The prospector

vote in Nevada is quite an issue and if he has senatorial ambitions, and should enter the race with this bill as a handicap, friend Key Pittman would make his efforts resemble those of a spavined horse in the derby. Better knock this bill in the head while its young and when you inter its remains bury it on its belly so that it won't have to turn over to go to hell. That's our honest criticism.

MAKING NEW MINES OF OLD ONES.

A larger number of old mines in Utah, Nevada, Idaho and Colorado are now either being whipped into shape for renewed production or else are being investigated with that idea in view. Reports from the various mining camps, backed by information emanating from mining machinery and supply houses, all go to show that hoisting works are being repaired, power plants remodeled and milling plants changed and revamped, so that better results than were previously obtained may be secured. All of this work indicates, if it indicates anything, that the revival in metal mining is coming along at a good pace. It will probably take several months yet to get the machine running in high gear, but the "tuning-up" process now is well under way.

Also, it is a noticeable fact worthy of repetition, that capital is beginning to seek an outlet through the acquirement of new, partially developed mining properties. The number of engineers being called into the field for examination purposes is growing all the time, and an occasional deal is being recorded. The future of metal mining is thus growing brighter every day. The ebb of the tide has ceased; the flow has begun.

UP AGAINST "CLEAR, COLD BUSINESS."

Dear Editor:—I noted with much interest your editorial in the July 30 issue of Salt Lake Mining Review, in which you recognize the fact that an engineer is justified in recommending to capital, the development of prospects which are not yet in shape to make a definite estimate of tonnage.

Recently, in trying to develop interest in a virgin field well worthy of development, I ran up against "clear, cold business" and the idea that a property is not worth talking about until it has been sampled and a definite estimate of tonnage made, and, apparently among New York mining engineers, the idea that this job of sampling and making estimate of tonnage is the very highest type of mining engineering.

Compared with the job of "sizing up" from all the evidence obtainable, properties not yet in a condition to sample and make an estimate of tonnage, and picking out the properties upon which development is apt to prove very remunerative, the above mentioned sampling and making estimate of tonnage is a mere boy's job which, with the possible exception of precautions against salting and trickery, can be learned in a few months. The other requires years in the field among mines in all stages of development. Yours very truly,

PAUL R. COOK.

Rolla, Mo., August 24, 1921.

Honest, fellows, isn't it nearly time that the old-fashioned practice of describing high-grade gold ore as "picture rock" be discarded?

The jerkless train has arrived in Sweden. By employing anti-friction bearings, technically known as disc bearings, in place of the present journal bearings on passenger cars, the resistance at starting cars is so reduced that from ten to fifteen per cent of the pulling force required with journal bearings will cause the train to move.

STAR OF WEST MANAGER TALKS ON EASTERN MINING CONDITIONS

By A. J. Moore

Reno, Nevada, Sept. 10.—Robert B. Todd, president of the Star of the West Mining company returned a few days ago from a trip to the East. He attended the annual meeting of the Star of the West Mining company at Pittston, Penn. At the meeting new officers were elected. They are as follows. Robert B. Todd, president and general manager; M. W. O'Boyle, vice-president; G. M. Todd, secretary and treasurer, Chas. M. O'Boyle and R. G. Withers being the other directors. All of the above are of Reno excepting the two O'Boyles of Pittston, Pa. M. W. O'Boyle is a very large coal operator of Pittston and has done much towards the financing of the Star of the West Mining company.

Mr. Todd in speaking of financial conditions in the east said: "I cannot say that as yet money is plentiful nor easy to obtain for western projects, but I do think that the situation is very hopeful. In a short time mining will attract much greater attention. Every one seems to be of the opinion that there is to be a mining boom. No one seems able to give any particular reason for it, except that it is in the air, so to speak. Possibly the wish is father to the thought, but no matter for what reason nor from what source the idea comes, the impression is growing throughout the east that a mining boom in Nevada may be looked for at any time. True, the public is not in the mining share market to any extent. On the New York Curb, in Philadelphia, Denver and Salt Lake City business on the exchanges is confined mostly to brokers trading back and forth, but that condition is usually a forerunner of the public coming in.

The story of the rehabilitation of the Star of the West Mining company is interesting and goes to prove what has been going on throughout Nevada during the past two years. Mines that were abandoned at that time have been turned into producers. New methods and new capital have taken hold of them and without attracting more than passing notice these mines have been developed into producers and in most instances put on a paying basis.

The Star of the West Mining company under the management of R. B. Todd has been rejuvenated from a dead one into a very live one and now nearing the self-sustaining stage. Development has been by tunnel work. What is termed the middle tunnel was practically abandoned as worked out by the original owners. Mr. Todd explored it and found that very much of the fills carried good milling values which led to further exploration, with the result that a new ore body has been cut. The ledge is about 15 feet wide. Some of this is waste or carries very low values, several feet will go over \$15, while two feet of high-grade shows assays of over \$200. The latter will be shipped while the balance will be treated at the company's 50-ton mill. This mill was erected under Mr. Todd's management and the ore is treated by a combination of amalgamation, floatation and concentration. Recently a shipment of 16 tons brought returns of \$2,113.31. Another shipment is about ready to go out which it is thought will go considerably higher.

Over one mile of development work has been done and the working force will soon be increased to three shifts a day. The mine has long been handicapped by the long hauls required. The mine is located about 40 miles southwest from Austin and heretofore all hauling has been to that point. Now Mr. Todd is making arrangements so that Fallon will be the headquarters of activities and base of supplies. While the haul to Fallon is little more than double that to Austin there are advantages at Fallon that more than offset the greater distance.

While in the east Mr. Todd was able to make very satis-

factory arrangements with the United States Smelting Co., which is inclined to make very much lower figures for handling the concentrates. Also freight rates seem to be much more favorable, according to Mr. Todd. With reduction of smelting charges and reduction of freight rates mining conditions are getting back to normal and cost of production and marketing getting down to a point that is encouraging to the miner. The next work at the Star of the West will be to continue the third or lower tunnel to a point under the new ore body recently opened on the level above. Following the dip of the vein this gives 106 feet of backs.

PRINCE CONSOLIDATED CLOSES DOWN.

Coincident with having demonstrated that the mine's greatest values existed in the beddings explored by the diamond drill more than two years ago, the management of the Prince Consolidated was compelled to close down the works a week ago for lack of funds with which to handle the water encountered and keep the development campaign moving.

"We have accomplished enough to make it certain that the mine can be made to yield handsomely from the 833-foot horizon," said Manager M. C. Godbe a few days ago. "We have recently had the property thoroughly examined by two of the best mining geologists in this country and they are agreed as to the great potential possibilities of the mine, and we regret exceedingly having to cease operations at this time. Plans are being worked out which we hope will require only a temporary cessation of operations, so that when mining conditions return to normal, as they must eventually do, the Prince will be ready to again take its position as a great producing mine."

In determining that the lower levels of the Prince can be relied upon to yield large quantities of fine commercial silver-lead ores more than \$100,000 has been expended and it will require no great amount, comparatively speaking, to attain the objective. It is no secret, however, that money-raising has been an almost impossible task for a year or more, so there has been nothing to do but close down until a re-financing plan can be worked out.

DEVELOPING COMPREHENSIVELY AT ALTA.

Dr. Hugo Rettich, who came out from New York recently to look after his mining interests at Alta, Little Cottonwood, returned from camp a few days ago and left for the east again Monday. Dr. Rettich is president of the old Hellgate Mining Co., which owns the old Frederick, Crown Prince, Helgate and other property in the heart of the old camp.

Dr. Rettich states that he has given orders for the driving of a 1000-foot raise from the Frederick tunnel level to connect with the bottom of the Frederick shaft, which was sunk in the vein to a depth of 230 feet in the early days and from which, including the output from the Crown Prince shaft, a production of more than \$200,000 was secured when these properties were in the limelight, many, many years ago. A new shaft, now down considerably more than 100 feet, has been started on the Hellgate claim, but work at this point will be discontinued during the winter months.

Dr. Rettich also is negotiating with the Wasatch Mines management for permission to drive into the Hellgate ground, a distance of some 200 feet, and from where he is anxious to go 100 feet farther to a point directly under the creek bed of the canyon. It hoped that the raise from the Frederick tunnel, if it does not develop ore, will at least point the way to development that will open up the downward extension of the orebodies developed in early days. The campaign mapped out by Dr. Rettich is a most comprehensive one.

Around the State

Advices from the property indicate that the Alta Tunnel & Transportation company has encountered a fine bedding of high-grade ore. Further development of the find is being expectantly awaited by shareholders in the company, the stock of which has materially advanced during the past few days.

It is stated that an important strike has been made in the mine of the Western Utah Copper company in the Gold Hill district. The ore is silver-copper, and, according to the reports reaching Salt Lake, this body of heavy sulphide ore assays from 4 to 15 per cent copper and from six to thirty ounces in silver.

Arrangements have been made by directors of the Pennuva Copper company, according to G. D. O'Connor, general manager, whereby depth exploration of the organization's property will begin at Proctor, Nev., and Saline, Utah. Both groups of claims are situated but a few hours' ride from Salt Lake City. As soon as the necessary machinery can be installed, driving of an adit at depth will begin, he says.

There is a full force of quartz now showing in the northeast drift on what is known as the 1600 level of the Iron King property in the eastern end of the district and officers of this company are expecting commercial values almost any day, says the Eureka Reporter. The showing is so encouraging that Supt. N. W. Roberts has put two shifts at work in the two drifts on the 1600 level, the other drift being sent off toward the southwest.

The wonderful granite of Bonanza Flat of this district is being quarried and shipped to one of the Salt Lake monument firms, says the Park City Record. Thirty carloads are to be shipped, and many of the blocks already marketed were as fine specimens of fine-grain granite as can be found anywhere in the world. It is susceptible of the highest polish. Len P. McGary has the contract for hauling the granite, and some twenty-five men are employed in quarrying and marketing the stone.

Production is to be started at the Carnation mine, in the Fish Springs district, about thirty-six miles south of Gold Hill, according to T. E. Wessel, under whose management the property has been reopened. Since 1891, mines of the district, the most important of which has been the Utah, have produced a considerable tonnage of high-grade silver-lead ore. From discovery in 1890 to 1914, the shipments from the Utah mine averaged per ton, 48c in gold, 128.35 ounces of silver and 44.04 per cent lead and had a total value of \$1,580,186.

The leasers who are working on the property of the "L" Marie Mining Co. located in the Stansbury mountains northwest of Grantsville report having made an important strike on the Raven claim of the property. Heretofore, all the work was done on claims higher up on the mountain but the discovery of ore further down the mountain has caused the owners of property as well as the leasers to feel very much encouraged with the new strike. The mine is located not far from the Western Pacific spur at Dolomite which will make the marketing of the ore comparatively easy.

Probably the richest shipment of carnotite ore ever mined was recently sold to buyers at Montrose, Colo., by Andrew Nylund of Grand Junction. The shipment consisted of forty tons and brought \$20,000. The ore was mined in the Gateway district and was the last of the out-

put of Mr. Nylund's mine there. During the last three years Mr. Nylund has received approximately \$80,000 for carnotite ore furnished from his Gateway mines. As the ore in the workings is now run out, the owner will devote some time prospecting in other eastern Utah and western Colorado sections.

In conformity with plans entered into by the principal stockholders of Selma Mines company, and White Star Mining company, both North Tintic properties, a merger has been consummated, making one big company. Papers consolidating the two were filed with the county clerk last week. The Selma, by this movement, absorbed the White Star. The later stockholders get one and one-half shares of Selma stock for every share of White Star stock turned into the company's office at 414 Judge building. The special meeting had been called by President W. I. Snyder of Selma and President J. C. Jensen of White Star. It is understood that the company is arranging plans for carrying on a comprehensive campaign of development work.

The shaft crew of the Walter Fitch, Jr., contracting company, at work at the Water Lily shaft of the Chief Cons. company, is making almost the same rapid headway that enabled it to break the world's record for the month ending on the 15th day August. For the last two weeks of the month of August the shaft was sunk on an average of about 12 feet daily and for 28 days the crew had a record of 337 feet of completed shaft to its credit. During the week the new shaft passed the 700 level and work is to continue indefinitely. If all goes well the Chief Cons. company will no doubt send this shaft on down to the water level and then commence a campaign of drifting for the development of their large East Tintic tract of land.—Eureka Reporter.

Articles of incorporation of the Silver King Apex Mining company have been filed with the secretary of state. The incorporators are Dr. George J. Field, A. L. Burns, I. C. Thoresen, W. T. Smith, R. G. Bosley, S. C. Hatch, J. F. Tyler, Roland Williams, G. B. Blakeley, Joseph Lapish, L. H. Gray, W. H. Williams, H. L. Wilkins, the Horseshoe Auto Tire company, H. C. Jex, K. E. Carlgren, John D. Winward and Loma Winward, all of Salt Lake, and Charles Osborn of Moulton, Idaho. The capital stock of the company consists of 500,000 shares, of a value of \$50,000, represented by a lease and option to purchase the Paul Jones, the Nelson, the Farragut and the Toga lode mining claims and United States mineral patent No. 06952, all located in the Cottonwood mining district of Salt Lake county. I. C. Thoresen is president of the company J. F. Tyler is vice president and L. H. Gray is secretary-treasurer. The officers, together with Roland Williams, R. G. Bosley, John D. Winward and Joseph Lapish, constitute the board of directors.

UTAH COPPER POSTS DIVIDEND.

New York, Sept. 8.—Directors of the Utah Copper company declared the usual quarterly dividend of 50 cents per share on the capital stock of the company at the regular quarterly meeting today.

Payment of 50 cents a share on September 30 will make the third disbursement of the year for Utah Copper stockholders. The first was at the rate of \$1 a share. The second, however, was reduced to 50 cents a share. Disbursements of the third dividend for 1921, aggregating \$812,245, will bring the grand total of dividends paid by the company to \$117,159,377.50.

Personal Mention

R. T. Walker, of the U. S. Smelting & Refining Co., Salt Lake City, Utah, made a complete inspection of the Franklin camp, southern British Columbia, during August.

F. E. Marcy, inventor of the Marcy ball and roller mills, came up from Hollywood, California, early in the month on a short business trip.

Earl B. Havenor, consulting geologist for the Tintic Standard Mining Co., has recently given up his offices at Eureka, Tintic, and moved to Salt Lake, with offices at 523 Newhouse building.

H. J. Gundlach, general manager of the Mine & Smelter Supply Co., Denver, was visiting the local branch of the company early in the month.

C. C. Cottrell, state highway engineer of Nevada and known to many good roads advocates in Utah, has resigned that position to become head of the good roads department of the California State Automobile association.

George H. Ryan, a prominent mining engineer of Ely, Nevada, was a Salt Lake visitor early in the month. He was here investigating processes of ore treatment that might be applied to some of his Nevada properties.

Jules V. Barnd, president of the Consolidated Spanish Belt Mining company, arrived at the property on the 3rd from Toledo, Ohio, for the purpose of witnessing the starting of the new concentration and flotation plant of that company.

Edward Flannery, the veteran mine-owner and prospector of Hailey, Idaho, was a Salt Lake visitor early in the month. He reports having recently made an important strike in his Lede Spencer property, nine miles from Hailey, on Deer Creek.

H. Foster Bain, of the U. S. Bureau of Mines, will be in Salt Lake City on Sept. 28 and 29, when a dinner will be given in his honor at the Commercial Club of the city. Mr. Bain will be asked to speak at a meeting of the Utah Section of the American Institute of Mining and Metallurgical Engineers.

Sterling B. Talmage, mining geologist and engineer of this city, has returned from a several weeks' professional trip into Arizona. He and his party traveled overland from the railroad through southern Utah's wonderland, taking in Bryce Canyon, Grand Canyon of the Colorado and other noted sections, returning in like manner.

Henry M. Adkinson, the well known mining engineer and general manager of the R. H. Officer & Co., assayers and chemists, returned from an extended eastern trip early in the month. He reports the East as gradually working itself into a state of normalcy and he looks for a genuine revival of metal mining interest during the fall and winter months.

Prof. E. H. Wells, who conducted special geological investigations for the Chino Copper company at Santa Rita, N. M., in 1920 and this year, is the new president of the New Mexico State School of Mines at Socorro. Professor Wells was graduated from the school of mines of the University of North Dakota in 1909, with the degree of engineer of mines. From then to 1912 he was assistant mining engineer and engaged in mining and leasing at the Daly West and Daly Judge mines at Park City, Utah.

Tudor S. Rodgers, who has been serving the great Teacopa Consolidated Mining Co., of Death Valley, as chief chemist for several years for the experience that it afforded in acquiring a practical knowledge of mining, has decided to join with his father again in the practice of law and make Salt Lake a permanent home. The senior Rodgers has maintained offices and practiced for years as a corporation lawyer in New York. Under the firm name of Rodgers & Rodgers, offices have been opened at 610 Walker Bank building, where corporation and mining law will be specialized in.

Dr. Ernest Untermann, the veteran geologist and mining engineer who, with his son, also a mining engineer, have been doing professional work in Uintah county, Utah, for more than two years past, were in Salt Lake a week ago on their way overland to the home ranch near Santa Rosa, California. The gentlemen are taking advantage of the fine fall weather to travel through and study certain mineral regions of western Utah and Nevada. Dr. Untermann states that nothing will be done at the old Dyer mine this year. The company owning it is being reorganized and, if plans mature, the property will be extensively developed, probably commencing next year.

Petroleum Notes

It is reported that some oil has been encountered in a well being driven by the Midwest company on St. Elmo creek, over the Colorado line, and about thirty-five miles east of Bluff, San Juan county, Utah.

It is sated by T. C. Conley of Green River, president of the Union Oil company of Utah, that plans are being made to finance the company for the purpose of completing a well drilled to a depth of twelve hundred and fifty feet on a synclinal structure east of the San Rafael Swell.

The bill passed to increase the price of gas to consumers in Philadelphia, Pa., was vetoed by the mayor of that city. The price of gas remains at the old figure, \$1 per 1,000 feet. Of this amount the gas company will receive 75 cents and the city 25 cents. The standard is still 530 B. T. U.

An important change in the plans of the Producers & Refiners Corp., regarding its operations in the Salt Creek field has resulted from the signing of contracts with the Midwest Ref. Co., whereby the two interests will jointly build a 12-inch gas pipe line from the Ferris-Mahoney-Wertz fields in Carbon county, to Casper, to supply gas for fuel to the Midwest and Standard Oil Co., of Indiana refineries.

A. B. Curtis, who is drilling an oil well for the Wyoming-Pacific Oil Company in the Fossil oil field, near Kemmerer, Wyoming, reports an extremely heavy flow of gas, which was encountered at a depth of 431 feet. This gas, when lighted, sent a column of flame high into the air, but was not measured for quantity. The gas was finally cased off and drilling proceeded.

The first shipment of material and equipment for the Ute Petroleum company's test well on the Cline anticline has arrived at Helper, according to information received by Field Superintendent Robert W. Gibson. It is expected that the initial shipment, consisting of two carloads of material, will be followed by several other cars within the next week or ten days. The site of the test well is sit-

uated on the Clyde Early permit, about eight miles northwest of the town of Duchesne.

Beaver Copper company is preparing to validate its oil land permit, according to an announcement mailed to stockholders of the company. The company had a contract with an oil company for the drilling of the ground but this contract lapsed as a result of a contest being filed against the Beaver Copper permit according to the statement which says the contest on the permit has been cleared. Due to adverse market conditions the company has been unable to sell treasury stock at acceptable price, necessitating the current assessment to meet costs that will be incurred in doing the validating work.

F. W. Strong, president of the Big Six Oil company, has returned to Moab, Utah, from Denver, where he had been in conference with a number of oil men relative to the development of the Big Six and Shafer oil domes on the Colorado river, twelve miles below Moab. It is reported that a deal was closed and while no details are given at the present time, it is expected that extensive operations on the river holdings will ensue as a result of the meeting. Drilling at the Big Six well is going on steadily and a depth of 1230 feet has been reached, with the drill still in the hard shale formation. Considerable gas pressure is noted, with oil showings in the bailings.

The wildcat being drilled by the Inland Oil & Ref. Co. on sec. 35-9-7, six miles south of Debeque, Mesa county, Colo., in which the Carter Oil Co. has an interest, begins to look like a failure. The well is reported to be below 2,950 feet. The Rollins sand in the Colorado group of the Mesaverde formation was tapped at 2,700 feet and was dry. It was 104 feet thick. Several sands have been cut but none contained oil in commercial quantities and the hole probably will be abandoned though no official announcement has yet been made. The Carter Oil Co. has a prospecting permit on 2,500 acres on this structure and a few miles to the west the Elk Basin Consolidated Petroleum Co. has some leases upon which a rig was moved recently. It is possible that another test will be made.—Wyoming Oil News.

IMMENSE COAL RESERVES IN ALASKA.

Alaska coal deposits have been given much attention during the last ten years but practically nothing has been done to develop them. Known coal deposits in Alaska should estimate reserves of approximately 150 million tons. Many of these deposits produce a high grade of steam coal and it can be conservatively stated that Alaska presents a larger potential coal reserve now than any possession of the United States; yet, in spite of these facts, there has been so much neglect of the proper plans in the developing fuel supplies from California, British Columbia and ment of Alaska that many Alaskan industries are import-even from the far east.

A sufferer who lives close to a railroad in the suburbs wrote the following to the railroad company, complaining about the racket made by a switch engine: "Gentlemen—Why is it that your switch engine has to ding and dong and fizz and spit and bang and hiss and pant and grate and grunt and puff and bump and chug and hoot and toot and whistle and wheeze and jar and howl and snarl and puff and growl and thump and boom and clash and jolt and screech and snort and snarl and slam and throb and roar and rattle and yell and smoke and smell and shriek like hell all night long?"—Boston Globe.

In Nearby States

ARIZONA

Within the past few weeks the Miami Copper company has made a shift of its productive operations from its ten-year-old No. 4 shaft to a newer opening, known as No. 5. The change was affected without interfering with production.

It is reported that V. G. Mellgren and J. L. Mellgren have purchased control of the Tombstone Co-operative Milling company's plant at Tombstone. The mill is to be operated on a custom basis and a new steam plant will be installed to furnish power. Four concentrating tables will be operated.

L. F. Williams, who has recently completed financing the further development of the El Capitan mines, in Gila county, reports that the mine has been completely unwatered and that recent development work has uncovered some 2000 tons of ore, assays from which average 24 ozs. silver besides some gold values.

The State of Maine mine, in the Tombstone district, which is under lease from the Bunker Hill Mines company to George Kitt and associates of Tucson, is now running. The first thing to be put in operation was a crusher and cyanide plant, which has been waiting on water. This is now being furnished by the Huachuca Water company.

Motorists coming to Patagonia from Benson report that a big gold strike has been made in the vicinity of the Hub City, just northeast of town, the exact location of which could not be learned, as we go to press. It is understood, however, that the strike is reported to be one of the richest made in that section in many years and the Tucson parties are interested and preparing to go to work at once on a large scale. Just what valuation the ores carry could not be ascertained, but it is said to be very rich in gold, and as a result Benson is in the throes of a feverish gold strike rush.—Patagonian.

COLORADO

Power has been turned on at the Silver Plume tunnel for the resumption of work.

Returns on the first carload of ore shipped from the Hope mine, at Aspen, netted the company \$1,288.26 with the high freight and treatment charges deducted.

It is reported that a vein of ore 14 inches wide has been encountered in the Fraction lode, near Idaho Springs, that carries 14 ounces of gold and 440 ounces of silver to the ton.

A vein two feet in width, sampling 3 ounces gold, 8 ozs. silver and 42 per cent lead has been encountered in the old Hyman mine, in the Consolidated Ten Mile Mining district by Pauling Maurer, superintendent for the Kokomo-Regent corporation. The Hyman mine has lain idle for the past five years and the work of cleaning out the oil workings was only recently completed.

W. C. Bickford, manager of the Consolidated Mines company, at Alice, accompanied by Jas. R. Pratt of Kansas, came up Sunday evening and made a trip to their property, returning Monday. Mr. Bickford says they will start operations on the Consolidated about October 1st, and also expects to have a mill in operation by the first of the year.

E. A. Tennis has been appointed general manager of the Gold King Cons. Mines company to succeed W. Z. Kinney, according to reports current in Silverton. Mr. Kinney

will be consulting engineer under the new arrangement. Mr. Tennis has been a frequent visitor to Silverton the past few months and will have unlimited local support in his new capacity.

The Emma Mine at Dunton after a period of idleness due to financial difficulties, low prices, etc., is to start work again at once. The Dolores Silver Mines, Inc., has secured new capital and paid up all indebtedness, and everything is in readiness for an active campaign this winter. Only a small force will be employed at first, but it will be increased as development justifies. R. L. Pellet will be in charge and the work will be pushed with vigor.

Raymond Baker, director of the United States mint, while in Denver recently, on a tour of inspection, predicted that domestic silver would not fall below \$1 an ounce within the next five years on account of reduced production and that the increased demand in Europe and the far east undoubtedly would send the price still higher. The present output of the Denver and San Francisco mints will be greatly increased in accordance with the government's plan to expedite the coinage of silver, he said.

John Hughes left for Durango where he will outfit for a bond and lease on the Mountain Lily mine in the La Platas. The Mountain Lily was owned by the late O. F. Boyle and has been tied up in litigation for a period of twenty years. Together with William Boyle, of Durango, Mr. Hughes has assumed control of the property and they expect to do considerable work there the remainder of the season and may possibly put in supplies for a winter campaign.

IDAHO

Preparations are being made for the driving of a 3000-foot new tunnel on the Ajax Mining company's property in the Coeur d'Alenes.

The directors of the Guelph Mining and Milling company, near Kellogg, Idaho, plan resumption of development work on the property. The mine has been idle for a year.

The Federal Mining & Smelting company has declared a dividend of 1 per cent on preferred stock. This is equivalent to approximately \$120,000. Payment will be made on September 15.

J. F. Teague and F. J. Dubie have struck a rich lead of ore on the Hammer prospect five miles northeast of Clarks Fork in the Blue Creek district. The values are in copper, silver, and some gold.

The Oom Paul mine, 600 feet east of the Hercules in the Coeur d'Alene, has been operated for years in an endeavor to locate a lost vein. It is declared this vein has now been discovered and proves to be very valuable.

The Grangeville Coal and Development company, prospecting for coal in the foothills three miles south of this town, has found a blanket lignite vein, 8 to 16 feet wide, which blow pipes and other tests demonstrate burns freely.

The Nabob Consolidated Mining company proposes to search for and develop the vein that is yielding lead-silver ore so generously to lessees of the Sidney mine, adjoining, according to a circular letter issued by J. E. Harrington, resident.

The Big Creek Mining company of the Coeur d'Alenes has added a 60-horsepower electric motor and other equipment, and expects to increase the production that has been maintained continuously for several months. G. Scott Anderson is manager.

The Walton Mines company, operating 14 miles north of Fairfield, Idaho, expects to finish its mill and commence the shipment of concentrates to Salt Lake about September 20th. Three hundred tons of mill feed running \$20 to \$30 has been stoped for milling.

George MacDonald, contractor for the Caribou Mining company, has finished his first contract on the tunnel at the mine, and has taken a second contract calling for an additional 100 feet. He is following a well defined ore-bearing ledge that is giving promise of soon entering the main ore body.

Fifty tons of ore has been shipped by the leasers in the No. 4 tunnel of the Western Union Mining company, in the Coeur d'Alenes. This is the nineteenth car shipped by them this year and is said to be about the best ore they have ever taken out. It was sent to the Bunker Hill smelter at Kellogg.

When in complete operation the Idaho Gold and Ruby Mining company at Leonia, Idaho, will, it is said, have the largest placer workings of its kind in the world. It is stated the Idaho Gold has four times as much water and six times as much acreage as the La Grange mine in Trinity county, California, which is said to be the largest in operation.

Six feet of milling ore has been struck on the Hilarity mine of the Pine Creek Mining company, on Pine Creek, according to a Kellogg, Idaho, report. The ore is a clean galena, and while it contains zinc the zinc is free from the lead. The body is in quartzite, which is unusual, as many ore bodies of the Pine Creek district have been in slate. The strike was made at a depth of 200 feet and in operations directed by H. W. Ingalls.

Dan Duncan and Ben Tracy, of Kooskia, claim discovery and show samples of lassitate ore said to carry 80 per cent values in tin. They found the ore in the Selway national forest, north of Kooskia. A prosecutor named English discovered last year a large body of graphite in the same neighborhood, and for some years a mud deposit since largely used as a medicinal agent, was unearthed on state school lands, upon which a long time lease was secured. The headquarters of the company are at Walla Walla.

The U. S. Silver-Lead Mines company, operating in the Eagle mine district near Murray, has disclosed ore in both drifts from the lower tunnel level, according to a Wallace, Idaho, report. This is at a depth of 350 feet on the dip of the vein. The Columbus Mining company, operating a mile south of the U. S. Silver-Lead, is developing a body of lead ore a foot and a half wide in a vein four feet wide. The vein contains a little gold and silver. An engine, boiler and compressor has been ordered and are expected to reach the property soon.

A 10-cent dividend has been declared by the Hecla Mining company, at a meeting in which the company ratified the action of the directors in settling with the Marsh Mines Company and the Federal Mining company. The dividend of 10 cents a share amounts to \$100,000, and is the third dividend this year. It will be paid September 28. The company's first quarterly dividend this year was \$150,000, the second was \$80,000 and the third of \$100,000 makes a total to date this year of \$330,000, and a total of \$8,835,000 paid by this Coeur d'Alene mining company.

In a letter to stockholders of the North Bunker Hill Mining company of Kellogg, the directors state that the crosscut from the 550-foot station in the shaft has been advanced 480 feet and that the work is now in the casing of the ledge, with every indication of cutting into the vein at any time. The present work is attracting considerable attention, as

the crosscut is entering a point directly beneath Haystack peak in a quartzite formation where the mineralized area is said to show a width of 340 feet in surface and upper workings.

Eugene Thomas reports that a new tunnel has been started on the property of the New Hope Mining company of which he is manager. The property is north of Osborn in the Coer d' Alenes. The tunnel will have to be driven 1800 feet to reach the main ledge, but a ledge of considerable importance has just cut the Guelph lead and started toward the Ammergris vein, when the flow of water became too heavy for the pumps and work was discontinued until additional machinery could be installed. The management expects to cut the Ammergris lead in about 200 feet.

NEVADA

John B. Newman, for many years superintendent of the La Tosca Mining company at Oreana, died at the Lovelock hospital on the 1st.

Operations are being prosecuted on eight levels of the Tonopah Belmont mine, and splendid results are being accomplished in a number of places. Development of an exploratory nature has been quite gratifying and reserves of ore are being blocked which will insure the steady operation of the big milling plant.

Tonopah's first after-the-strike pay day with old and new men mingling, passed without particular incident and the town resembled old times with everyone spending freely and the dance halls packed with men. Previously the banks sent the money to the Belmont and Extension mines for payment but checks for cashing down town had been resumed. The payroll amounted to nearly \$250,000.

The Giant Mines company, controlling a group of claims about one-half mile southeast of the Tonopah Divide and almost adjoining the Toggery holdings, has resumed operations, and a thorough campaign of development will be carried forward. I. P. Carpenter, widely known to mining circles throughout both Nevada and Colorado, has been selected superintendent of the company.

H. M. Witt, mining engineer of Virginia City, was an arrival in Tonopah recently, where he went to make an examination of the Cash Boy mine in order to familiarize himself with conditions in preparation for the pending legal controversy in which the Cash Boy Mining company finds itself involved through a suit brought in the district court of Washoe county by the Tonopah Extension Mining company.

Sheriff J. D. Hillhouse yesterday took possession, under writ of attachment, of office furniture in the Herz building owned by the Fidelity Finance & Funding company, which is headed by George Graham Rice. The writ is a corollary of a suit brought by James T. Boyd against the company for recovery of \$1917.40. The company, he alleges, agreed to pay him what it owed him at the rate of \$500 a week, but only \$500 was paid.—Reno Journal.

The office of the Eureka-Croesus Mining company in Eureka, Nev., received a telegram from the New York office of the company, announcing that Major Henry G. Catlin, consulting engineer of the Eureka-Croesus company had been stricken with paralysis. His entire left side was affected, and he had lost the power of speech. Major Catlin

visited Eureka last month and remained a week, leaving on his return to New York on August 14.

Extensive development work is planned by the Nevada Silver Klondike company on the Great Western mine in the Stampede district, near Pioche. Colonel Maurice J. Fink, the general manager of the company, has returned from New York City and other eastern points, and expressed himself as more than pleased with the conditions at the company's property, stating that development will be pushed with vigor. Manager Fink was surprised at the amount of development work already accomplished by W. E. Brodie, who has contracted the entire development work to date. All the mining work done is under the direction of John Carter Anderson, mining engineer of Tucson, Arizona, whose conservative constructive recommendations insure the success of the enterprise.

Trade Notes

The Link-Belt Company announces a practically uniform reduction of 10% on malleable iron and steel (SS Class) chains, sprockets, buckets and other products, effective at once. Discounts on application.

Everyone interested in reducing blasting costs—road contractors, quarrymen and others—should secure from the Salt Lake or some other branch of the Hercules Powder Co. a copy of a little booklet just off the press entitled "Volume vs. Weight," which contains a lesson in explosive economy worth reading.

The Haynes-Stellite Company of New York has applied to the Power Commission for a license for a power project located on Big Creek, Idaho. The project includes a diversion dam, a 400-yard conduit, and a power house developing 270 horsepower, to be used for mining and milling purposes.

The Salt Lake Hardware Co. announces the closing of contracts which give this mammoth concern the exclusive handling of several important lines of goods that will be appreciated all over the western mining regions, as follows: Crocker-Wheeler Co., electric motors; Maloney Electric Co., transformers; Sangamo Electric Co., meters; Electrical Engineers' Equipment Co., power-house equipment; Mancha Storage Battery Locomotive Co., mine and industrial locomotives; American Blower Co. Complete stocks in all of these new lines will be carried, so that demands can be quickly met.

DIPS.

What the world needs is an automobile that has horse sense.

Every property owner possesses one right of which no one ever seeks to deprive him—that of paying his taxes.

A new cave of vast proportions has been discovered about five miles southwest of Victor, in Fremont county, Colorado. It is believed by persons who have explored it partially that the cave probably extends a mile or more. The cavern is in the carboniferous lime formation and not far from the juncture of Wilson and High creeks. Spacious halls, with beautiful stalactite and stalagmite formations pillaring their walls run far off into the echoing and unexplored distance. Abrupt cliffs in the floors make exploring extremely difficult. A rock thrown over one of these dark abysses did not reach bottom for eight seconds.

CHIEF CON. IN EXCELLENT CONDITION

In the second quarterly, or half-yearly report of the Chief Consolidated Mining Company, recently mailed to shareholders Manager Cecil Fitch and Superintendent J. Fred Johnson make the following exhibit of the mine and company's present status which is counted as most excellent under prevailing conditions:

"As compared with the previous quarter the net profit was increased slightly. The development footage and tonnage of ore shipped was more. The metal content although lower in silver, was balanced by an increase in lead, thus the average gross value of the ore remained the same. The smelting, freight and sampling charge per ton advanced 10 cents.

"Development work is progressing satisfactory and on basis of about six miles per year. In the neighborhood of No. 2 shaft quartz leads were found of low silver value which are being prospected.

"The Water Lily shaft mentioned in the superintendent's report is on the extreme eastern part of the company's property. This section is considered by the management to be promising for ore deposits. The ore in sight throughout the mine has been fully maintained."

For the second three months of the year the total shipments of ore was 22,560 tons dry weight, according to Superintendent J. Fred Johnson, and this ore yielded, after smelting, transportation and sampling charges, \$486,351.92. A total of 10,452 feet of work was performed as follows: drifts 8,145.5, raises 2,207.5, winzes 99.

The average gross value on all ores was \$40.02, the average cost of sampling, freight and smelting was \$18.46, leaving an average net value per ton of \$21.56. The net profit after payment of all charges was \$45,239.07. For the second quarter of the year development work was performed in the first ore zone on all levels from the 800 to the 2000, and in the second ore zone on the 1600, 1800, 1900 and 2000 foot levels. Ore was produced from all of the ore channels and from all levels, according to the superintendent's report.

Total dividends of the Chief Consolidated company to date amount to \$2,004,121.97.

DEVELOPMENT PROGRESS AT KING CON.

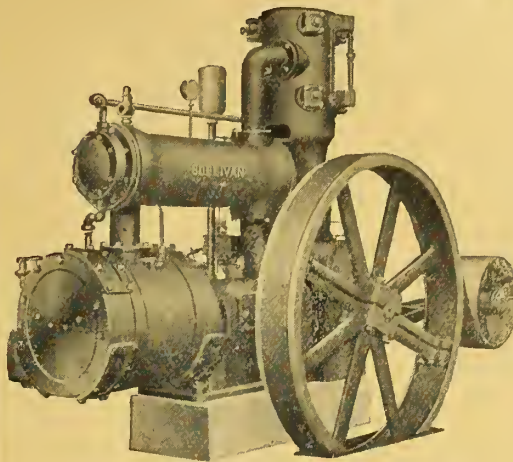
At the Spiro tunnel of the Silver King Consolidated Park City, Utah, according to reports of a few days ago, three feet of high-grade silver-lead-copper ore still appears on the face of the drift west from the iron raise, and about twenty-five feet above the tunnel level. The ore is being saved as broken.

Considerable difficulty has been experienced in keeping the drift in the ore. After sloping upward for many feet the ore shoot turned downwards. It could not be followed by an incline, because of the descending water which would quickly have filled any depression. It was necessary to cut down the floor of the drift clear back to the raise every time the ore dropped down in the face.

For this reason progress has been slow. Now the drift on the tunnel level is being extended westerly to intercept the ore on its dip, if it comes down so far, or to divert the water if the ore turns upward again. Above the solid ore which fills the face of the drift three feet up from the bottom, are bunches and fragments of the same kind of ore imbedded in iron pyrite.

The main tunnel is passing through a softer formation of quartzite and making a heavy flow of water. The breast is mineralized. No important changes have been noted in the prospect work on the upper levels.

FITCH'S WORLD'S RECORD



Sullivan Angle Compound Air Compressor

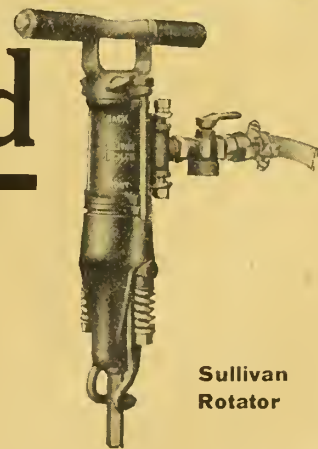
**A
Great
Crew
On A
Great
Job!**

They relied on dependable air and dependable drills.

A Sullivan Angle Compound furnished the air for the drills.

A Sullivan WG3 Compressor furnished air for handling timber.

Rotators Helped Too!



Sullivan
Rotator

Sullivan Machinery Company

1606 WALKER BANK BUILDING
SALT LAKE CITY

SALT LAKE MINING STOCK QUOTATIONS

The range of the market from August 26th, 1921, through September 10th, inclusive. Quotations furnished by J. A. Hogle & Co., direct wires to all leading markets, 169 So. Main St., Salt Lake City, Utah, and ground floor of Eccles Building, Ogden, Utah.

Stock.	Open.	High	Low	L. S.	CLOSING		
					Bid.	Asked.	Sales
Antelope Star	.011	.011	.011	.011	.01	.04	6000
Alta Con.	.011	.011	.011	.011	.01	.04	6000
Alta Tiger	.04	.04	.04	.04	.03	.04	1000
Albion Cons.	.04	.04	.04	.04	.03	.04	1000
Am Metals	.05	.11	.05	.10	.09	.10	96700
Alta Tun.	.021	.031	.021	.031	.02	.03	19000
Bullion	.021	.031	.021	.031	.02	.03	3000
Big Hill	.011	.02	.011	.02	.10	.10	63500
Big Cot Coal	.07	.10	.06	.10	.01	.01	16000
Bingham	.07	.10	.06	.10	.05	.10	1000
Beaver Cop.	.07	.07	.07	.07	.01	.05	6600
Bay State	.07	.07	.07	.07	.01	.01	450
Black Metals	.18	.19	.16	.18	.01	.02	450
Colb Rexall	.18	.19	.16	.18	.01	.02	450
Colorado Con.	1.00	1.00	1.00	1.00	1.00	1.12	450
Crown Point	1.00	1.00	1.00	1.00	1.00	2.50	100
Cardiff	2.25	2.25	2.25	2.25	2.00	2.35	100
Daly	2.25	2.25	2.25	2.25	.03	.01	1500
Daly West	2.25	2.25	2.25	2.25	.02	.04	5200
Dragon	2.25	2.25	2.25	2.25	.02	.02	5000
Emma Silver	.03	.03	.03	.03	.07	.10	8500
Empire Mines	.03	.03	.03	.03	.05	.05	7300
Eureka Mines	.02	.02	.02	.02	.10	.04	11220
E Crown Point	.02	.02	.02	.02	.03	.04	450
E Tin Con.	.09	.09	.09	.09	.06	.08	6000
Eureka Lily	.05	.05	.04	.05	.05	.05	2000
Eureka Bullion	.05	.05	.04	.05	.05	.05	2000
Grand Central	.04	.04	.03	.03	.03	.04	11220
Great Western	.04	.04	.03	.03	.03	.04	450
Howell	.15	.15	.15	.15	.06	.08	6000
Iron Blossom	.09	.09	.09	.09	.05	.09	6500
Iron King	.09	.09	.09	.09	.02	.02	43750
Judge M. S.	.09	.09	.09	.09	.02	.02	2000
Kennebec	.02	.02	.02	.02	.02	.02	2000
Lehi Tin	.02	.02	.02	.02	.02	.02	2000
Leonora	.02	.02	.02	.02	.02	.02	2000
Logger	.01	.01	.01	.01	.01	.01	2000
Monzonite	.01	.01	.01	.01	.01	.01	2000
May Day	.01	.01	.01	.01	.01	.01	2000
Michigan-Utah	.03	.04	.03	.04	.04	.04	21000
New Quincy	.06	.06	.05	.05	.05	.05	111700
No. Standard	.02	.03	.02	.03	.03	.03	11430
O. K. Silver	.01	.01	.01	.01	.01	.01	500
Opohongo	.01	.01	.01	.01	.01	.01	500
Old Emery	.20	.20	.20	.20	.15	.19	2000
Plutus	.20	.20	.20	.20	.15	.19	2000
Prince Con.	.15	.17	.07	.08	.08	.08	61100
Paloma	.15	.17	.07	.08	.08	.08	61100
Pioche Bristol	.01	.01	.01	.01	.01	.01	3000
Price Mining	.03	.03	.03	.03	.02	.03	4000
Provo	.03	.03	.03	.03	.01	.03	1500
Rico Arg.	.03	.03	.03	.03	.01	.02	1500
Reeds Pk. Cons.	.03	.03	.03	.03	.01	.02	1500
Rico Well	.03	.03	.03	.03	.01	.02	1500
So. Standard	.15	.15	.15	.15	.15	.15	8600
Sells	.05	.05	.03	.03	.02	.03	26600
Syndicate	.05	.05	.03	.03	.02	.03	26600
Sil. King Coal	1.65	1.70	1.65	1.65	1.60	1.65	800
Sil. King Con.	.81	.87	.81	.82	.80	.83	9774
Sioux Mines	.02	.02	.02	.02	.01	.01	1000
Swansea Con.	.25	.25	.25	.25	.30	.30	100
South Hecla	.06	.08	.06	.08	.07	.09	2900
Silver Shield	.06	.08	.06	.08	.07	.09	2900
Tacoma	.01	.01	.01	.01	.01	.01	4000
Tar Baby	.01	.01	.01	.01	.01	.01	2000
Tintic Central	2.15	2.15	1.82	1.97	1.97	2.00	18825
Tintic Stand.	2.15	2.15	1.82	1.97	1.97	2.00	18825
Utah Con.	.01	.01	.01	.01	.01	.01	1000
Union Chief	.01	.01	.01	.01	.01	.01	1000
Victor Con.	.01	.01	.01	.01	.01	.01	1000
Victor Mng.	.01	.01	.01	.01	.01	.01	1000
Whirlwind	.01	.01	.01	.01	.01	.01	1000
West Toledo	.01	.01	.01	.01	.01	.01	1000
Walker Mng.	2.05	2.05	2.05	2.05	2.05	2.10	1800
Woodlawn	.15	.18	.13	.13	.13	.13	35900
Yankee Con.	.03	.03	.03	.03	.03	.04	7000
Zuma	.03	.03	.03	.03	.03	.04	7000

ORE SHIPMENTS.

During the two-week period ending on the 9th, Park City mines shipped 3,268 tons of ore, as follows:

Judge Allied Companies	1,229
Ontario Silver Mines	826
Silver King Coalition	1,213

Total tons.....3,268

For the two-week period ending on the 9th the product of the mines of the Tintic district shipped to the mills and smelters a total of 292 carloads of ore, aggregating fifty tons each, or 14,600 tons, as follows:

Tintic Standard	81
Chief Consolidated	72
Dragon Consolidated	22
Victoria	25
Grand Central	11
Eagle & Blue Bell	19
Centennial-Eureka	12
Iron Blossom	13
Swansea Consolidated	10
Bullion-Beck	6
Iron King	5
Colorado Consolidated	5
Sunbeam	3
Eureka Mines	1
Gemini	4
Gold Chain	1
Mammoth	2

Total carloads 292

ASSESSMENTS PENDING

Beaver Copper Mining company, $\frac{1}{2}$ c a share. Delinquent October 5. Sale day October 24.

Cherry Creek Silver Mining company, $\frac{1}{4}$ c a share. Delinquent September 29. Sale day October 20.

Log Cabin Mining company, $\frac{1}{4}$ c a share. Delinquent September 27. Sale day October 20.

West Toledo Mining company, 1c a share. Delinquent September 20. Sale day October 14.

Howell Mining Company, 1c a share. Delinquent September 26. Sale day October 22.

Provo Mining Company, $\frac{1}{4}$ c a share. Delinquent September 26. Sale day October 31.

METAL MARKET QUOTATIONS, SEPTEMBER 10.

Silver	99 $\frac{1}{4}$ c
Silver, in London	63 $\frac{3}{4}$ c
Copper	12 $\frac{1}{4}$ -12 $\frac{1}{2}$ c
Lead	\$4.60
Zinc	\$4.15-\$4.25

English scientists have found that glass can be permanently tinted by emersion in the hot mineral waters of Bath, long famous as a health resort.

FOR SALE STAMP MILL.

5 one thousand pound stamps in good condition, cheap. George F. Wasson, 433 Clift Bldg., Salt Lake City.

RAISE BIG CAPITAL. WRITE FOR

Free Copy "Quick Financing" if you need big capital for Oil, Mining, or Industrial business. Cunningham, Financial Specialist, Dept. V, Chamber Commerce Bldg., Pasadena, Cal.

The Salt Lake Mining Review

VOL. 23 NO. 12

SALT LAKE CITY, UTAH, SEPTEMBER, 30 1921

SINGLE COPIES, 15 CENTS

Rock Strata Gases in East Tintic Mines.

By G. E. McElroy*

The development of certain mines in the East Tintic mining district, Utah, has been hindered considerably by the presence in the rock strata of heavy irrespirable gases which at times flood the lowest working places, as well as by abnormally high rock temperatures in the lower horizons. A study of these features was completed in the spring of this year, and the information obtained is summarized here.

Only four mines have been affected to date by the presence of heavy gas, and only one of these is producing lead-silver ores in quantity. These four embrace a territory extending about three miles north and south and about two miles east and west, while both within and fringing on this territory are a number of prospects which have not been affected.

Thus far no fatalities have resulted from gas inflows, but a number of men have been temporarily overcome, and a few have had narrow escapes from death by suffocation. That the record is not more serious is mainly due to the fact that the gas inflow, as a rule, is relatively slow, mining operations have been quite carefully conducted, and the presence and extent of a gas inflow can be easily determined by its extinguishing action on the flame of miners' lights.

When first encountered, about 1910, gas inflows occasioned much lost time. In some months the lost time averaged as much as ten days, while one mine cites for a certain month a maximum of 26 days lost out of a possible 28 working days. With improvements in mechanical ventilation and the passing of time, interference with work from the presence of gas has gradually lessened.

During the last few winters, the main trouble has been with the mines being flooded with gas overnight when fans were not operated, although men have been driven out of the lowest development openings several times each winter with fans operating. At present, the main danger is in the lowest development openings having only one exit, wherein men might be trapped and possibly suffocated during an unusual and extremely rapid inflow of gas, or during an ordinary inflow, should the one source of power for the fan be disabled.

Affected Mines Near Crest of Anticline

The affected mines are on or near the crest of a large anticline composed of sedimentary rocks, almost entirely overlain by lava flows. The sedimentary rocks consist of a great thickness of quartzite separated from overlying limestones of considerable but varying thicknesses by a formation of pyritic shales, 300 to 500 feet thick, containing interbedded limestones.

*Mining Engineer, U. S. Bureau of Mines.

As a rule, these heavy gases peculiar to this district, are not encountered in mining until the quartzite is pierced, although they occur in places in fissured zones in the overlying limestones. Abnormally high rock temperatures also appear to be limited to horizons close to the quartzite.

Samples of the heavy gases all showed on analysis, some oxygen content, attributed to diffusion with mine air. Calculation of the analyses of samples having a low oxygen content to an air-free basis shows that the pure gas is primarily a mixture of carbon dioxide and nitrogen with the carbon dioxide in excess. The gas also contains some sulphur dioxide, sufficient to cause marked irritation of the eyes and nasal passages, and to give it a strong sulphur odor. Air-free calculations for the samples analyzed show that, for the pure gas, the carbon dioxide ranged from 60.7 to 76.7 per cent and the nitrogen from 39.3 to 23.3 per cent, the composition varying as to locality rather than time or other condition. The pure gas is saturated with water vapor, and the temperature noted, 84 to 110 degrees, correspond roughly to rock temperatures of the localities where observations were made.

Comparison of the calculated weights of saturated gases with weights of partly saturated air for the range of temperatures, relative humidities and barometric pressures existing in the mine openings, shows that the gas is 1.25 to 1.40 times as heavy as the adjacent air. The difference in weight causes the gas to drop to the floor of openings, where it drains like so much water to the lowest points, and forms accumulations or pools. Diffusion of the gas with the mine air is relatively slow in quiet atmospheres, but increases as the air motion is increased, so that at velocities of several hundred feet per minute and over, diffusion is practically instantaneous during an ordinary inflow.

Oxidation of Sulphides Produce the Gases

The evidence gathered from the mines affected indicates that the heavy gases have resulted from oxidation of sulphides, and confirms the explanation offered by Lindgren and Loughlin in their geological report on the East Tintic district, published as U. S. Geological Survey Professional Paper 107. Oxidation was, and is, extremely rapid, due probably to extreme fineness of the individual grains of sulphide, both in the shale and in the ore bodies.

The steps in the formation of the heavy gases were probably as follows: The chemical reactions of oxidation, by removing the oxygen in the available air, produced a residual atmosphere composed of practically pure nitrogen**, and generated heat, sulphur dioxide and sulphuric acid. When the acids came in contact with limestone or other carbonates, carbon dioxide was generated, which dif-

fused with the nitrogen and sulphur dioxide. This resulted in the formation of a heavy gas which, on account of its weight, settled down through the porous and shattered quartzite, and now rests presumably on water at an unknown depth. The sulphur dioxide would be continually oxidizing and reacting, so that it would ultimately disappear from the gas, leaving carbon dioxide and nitrogen.

A study of individual inflows in the mines affected shows that the time and amount of gas inflows is determined by variations of barometric pressure, or the pressure of the atmosphere, and that the inflows are caused by rapid and extreme decreases in pressure. Since such decreases are quite prevalent from November to April, and are quiet from May to September, gas inflows are also quite frequent during the winter months, and happen rarely or not at all during the summer months.

Weather Conditions Affect Gas Inflows

Local weather conditions are intimately associated with the gas inflows, such as southwest winds preceding and accompanying an inflow, and precipitation usually immediately following an inflow, are also closely associated with the barometric pressure changes that produce the inflow. The atmospheric low-pressure areas, or storm-centers, that affect the district, almost invariably pass to the north of the district and from west to east, and the local topography is such that winds are diverted to a southwest course that would otherwise assume the direction of a line joining the district and the center of the low-pressure area.

Precipitation takes place when the pressure rises following the period of low pressure, because the rise is accompanied by a normal shifting of the wind from south to southwest, and the southwest (and west) winds come from the source of moisture, the Pacific ocean.

The following theory has been deduced to explain the mode of occurrence of gas inflows: A decrease in barometric pressure causes an increase in volume, according to the laws of gases, of a large body of gas contained in the quartzite and resting on water at an unknown depth. As the gas body is confined on the sides and bottom, the increase in volume tends to raise the level of the gas. However, since field observations show heavy inflows only from shattered and fissured zones, it is concluded that the rate of penetration of gas into the porous quartzite is so much slower than the rate of increase in volume that the excess is pushed up through the shattered, more or less open, zones that occur in the quartzite.

Under certain conditions of rate and amount of decrease of barometric pressure, the gas rises to the levels of mine openings and an inflow of gas results. The upward travel of the gas is limited by the practically impervious shale overlying the quartzite, except where local fissures in the shale provide access to connected fissure zones in the overlying limestones. As the barometric pressure rises, the increase in pressure causes a contraction of the gas body and the level of the gas in the shattered zones recedes.

Rock Temperature—Ventilation Best Remedy

Rock temperatures of 80 degrees to 110 degrees in gas-producing horizons 900 to 1600 feet below the surface were obtained, while air temperature in several dead ends indicated possible rock temperatures as high as 120 degrees. Rock temperatures appear to be dependent mainly on locality, to a less extent on geologic formation, and practic-

ally independent of depth, which in other districts is usually the governing feature.

Unfortunately the highest rock temperatures are accompanied, as a rule, by the lowest relative humidities, but efficient mechanical ventilation of all working places is necessary to provide moderately comfortable, and in some cases even bearable working conditions.

The necessity for good air motion at working places and the relatively slow rate of gas inflow, indicate that the best remedy is dilution of the gas inflow with large volumes of air by mechanical ventilation. To make the remedy effective under all circumstances, both for efficiency and safety, two independent sources of power for ventilating apparatus should be used.

ANOTHER UTAH CHAMPIONSHIP MINE CREW

Following the work of Tintic metal miners in wrecking all world's records for rapid shaft-sinking, a team of Utah coal miners during the opening days of September slipped over to St. Louis and captured about everything in sight in the way of championships for first-aid and mine-



rescue work. The occasion was the sixth international first-aid and mine-rescue meet conducted under the auspices of the U. S. Bureau of Mines and cooperating agencies. Fifty-eight first aid and fourteen mine rescue teams competed. The team, whose pictures are given herewith, represented the Independent Coal & Coke Company, of Kenilworth, Utah. The banners and cups they display were the trophies for being winners of first prize for the highest score in first-aid and mine-rescue; Rocky mountain states championship in first-aid; Utah championship in first-aid, and Utah championship in mine-rescue. The members of the team are, reading from left to right, top row; J. R. Roaf, (captain); H. B. Meyers and A. J. Butte; kneeling, E. Lloyd, C. L. Leavitt and G. B. Jackson.

Ore from the property of the Electrolytic Copper Company in Albany county, Wyoming, carries 1 ounce in platinum, palladium and gold, 7 ounces in silver per ton, and 25% of copper. This is probably the first instance of palladium being mined on this continent. This metal, which belongs to the platinum group, is used as an alloy for hair-springs in watches.

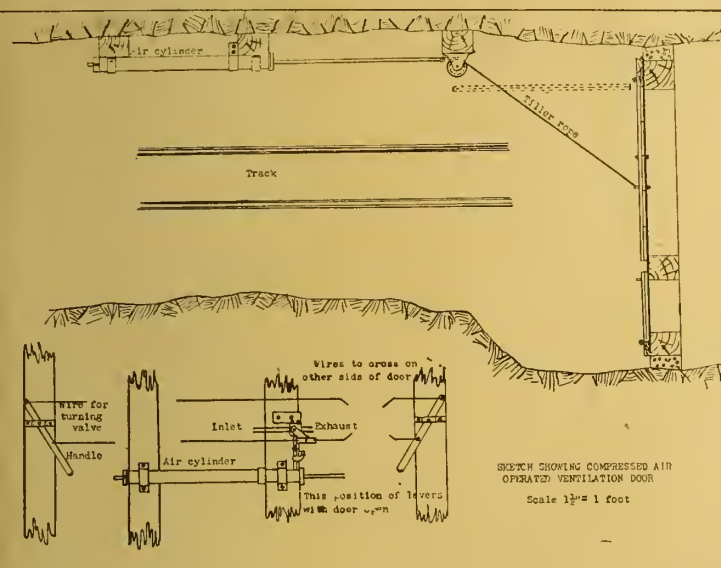
**Note: In one mine a small body of hot gas of high nitrogen content was noted, in a cavity in the roof. This was produced by rapid oxidation of pyrite, and may have represented an initial stage in the formations of the heavy strata gases.

AIR-OPERATED VENTILATION DOORS IN LARGER ARIZONA COPPER MINES

By E. D. Gardner*

It has only been in recent years that the proper ventilation of metal mines has received serious consideration. Increasing temperature and humidity with greater depth in some of the larger mines of the West prevented the efficient operation of the mines and made the installation of mechanical ventilation systems necessary. Doors that interfere with tramming are generally needed to control properly the mechanically induced air currents and are one of the inherent disadvantages of the system. In fact the necessity for the use of doors in the main haulageways has discouraged the installation of mechanical ventilation in some metal mines.

A number of mining companies in Arizona are using ventilation doors which can be opened and shut mechanically by the motorman without leaving his seat or stopping his train, and thus interfere very little with the transport-



ation of the ore. The Copper Queen branch of the Phelps-Dodge corporation at Bisbee introduced these ventilation doors and adapted them from those in use in the company's coal mine at Dawson, New Mexico. Other mining companies have installed the same type of door and it is now being used in a number of districts in Arizona.

The doors at the Calumet and Arizona mine in the Bisbee district are representative of those in use. The doors at this mine are substantially built of 2-inch lumber, are air tight, are well placed and have two openings or passageways. The main door, which is used for the motor trains, is 5 feet wide by 6 feet high and is opened by compressed air and closed by a counterweight. At the side of the motor door is the man door, which is 18 inches wide by 6 feet high and is opened and closed by hand.

The mechanism for opening the main door consists of a section of 5-inch pipe about five feet six inches long, threaded at both ends and used as an air cylinder. A piston fits in the cylinder and is attached to a 1-inch plunger rod which passes through a stuffing box at one end of the pipe. The free end of the rod is attached to a rope that goes over a pulley and is fastened to the door. A 3/4-inch pipe connection from the compressed-air line is tapped

into the cylinder at the packing end. When the air is turned on, it forces the piston to the other end of the cylinder and thereby opens the door. The door is held open as long as the air pressure is maintained, and is closed by the counterweight and the force of the air current when the pressure is released. The air is turned into the cylinder from the main air line through a three-way cock. Levers placed at some distance from and on either side of the door, are connected to the air cock by two wires. When a train approaches the door, the motorman reaches out and pulls the first lever, this opens the cock, turns the air into the cylinder, and opens the door. After the train has passed through the door, the motorman pulls the lever on the other side which shuts off the air, releases the pressure in the cylinder and the door is closed. The motorman on a train coming from the opposite direction would pull the same levers, but in reverse order, as these are so arranged that the doors are opened or closed by pulling the levers in the direction of the moving train. The distance that the levers are placed from the door depends upon the length and speed of the trains, but should be long enough to give the motorman time to stop his train before it wrecks the door if the mechanism failed to work. At the Calumet and Arizona mine the distance is 150 feet.

A red light is generally placed at each lever and other safety precautions taken. Some doors have been demolished in some of the mines by trains striking them, but with ordinary care on the part of the motorman the use of the doors is safe and no accidents should occur. None of the doors have been touched by trains in the Calumet and Arizona mine for a number of years.

The Magma Copper Co. at Superior, Arizona, uses a modification of the same door in the main haulage level. As no supplemental man-doors are used, the danger of a man being struck when the doors are opened was obvious, and whistles which start to blow as soon as the air pressure is turned on were placed in the air cylinders and give warning to all in the vicinity. The whistles also continue to blow as long as the doors are open and remind all in that part of the mine to release the air.

The accompanying sketch shows the general construction of the doors at the Calumet and Arizona mine.

NEW DISCLOSURES OF MAGNITUDE OCCURRING IN PARK CITY MINES

Information released to the daily press a few days ago by George W. Lambourne, general manager of the Judge Allied mining Companies of Park City, is of such an assuring nature that everybody interested in the famous old silver-lead district will readily see that its future possibilities are beyond present computation. The story, as it appears in the Salt Lake Tribune of the 20th, makes it apparent that the eastern portion of the district is in line to repeat at least a portion of the history made in the portion of the camp running westerly from the Ontario Silver Company's mines and which, according to Mr. Lambourne, reporting for his companies, also is again stepping to the front with new disclosures of more than passing moment.

For many years it has been believed that the fissure system so productive in the Ontario, the Silver King Coalition and other famous Park City producers, was cut off by a great porphyry dike which cuts the mineralized zone almost at right angles in the Ontario mine. Consequently, nearly all of the work done in the district has been in the ground to the west of the porphyry intrusion.

Notwithstanding the weight of evidence in favor of the theory that the Ontario dike had cut off the deposits lying

*Mining Engineer, U. S. Bureau of Mines.

to the westward, the Park-Utah Company, one of the Judge Allied companies, some time ago began a campaign of exploration to ascertain if the Ontario fissure system would not prove as productive to the east in virgin ground as it had in the older part of the camp.

Work Is Progressing

In regard to the success of this work in Park-Utah ground, George W. Lambourne, president and general manager of the Judge Allied companies, said that ore had been encountered to the east of the Ontario property in sufficient quantity to warrant the belief that this virgin territory had possibilities. Not only has the vein system being explored at present approximately the same strike and dip as the Ontario fissure, he said, but the character and values of the ore are such as to favor the opinion that the continuation of the mineral channel had been struck to the east of the intrusion, which has been believed to form the line of demarcation between the mineralized and non-mineralized parts of the camp.

However, much exploration work will have to be done before it can be proved that the vein in which the recent strikes in the Park-Utah were made is the continuation of the Ontario fissure system, said Mr. Lambourne. Nevertheless, even if this fissure should prove to be other than a continuation of the Ontario system, the deposits opened up recently in Park-Utah are of such value and magnitude, according to mining men who have visited the property, as to indicate that the camp is about to enter upon an era of increased production and augmented development.

Mineralization Extensive

Work has been carried on in the Park-Utah from the Ontario lower drain tunnel owned by the Ontario Company and the Daly Mining Company, of which latter company the Judge Allied Companies hold a controlling interest. Approximately 8,000 feet from the portal of the Ontario tunnel a crosscut to prospect the important fissures of the Park-Utah property was begun.

Several shoots of excellent shipping ore, all on the same horizon, have been cut by this crosscut, called the 1,800-foot level. One of these shoots has been followed on the strike of the vein for a distance of about 300 feet. Crosscuts run at intervals of sixty feet, according to Mr. Lambourne, prove that the shoot has a width of from five to twenty-seven feet of shipping ore.

Furthermore, on the 1400-foot level, which on the dip of the vein is approximately 130 feet higher than the 1500-foot level, four or five feet of shipping ore has been opened, it is said, which the management believes to be the upward extension of the mineralization found below.

Inasmuch as the 1500-foot level underlies all of the formations proved so productive in the district and as the ore so far found lies in the quartzite underlying the favorable limestones, officials of the company believe that the importance of the work as it nears the sedimentaries, thought to lie 200 feet above, is increasing.

At present enough ore has been blocked out on the 1500-foot level, says Mr. Lambourne, to continue shipments without any interruption. To facilitate the handling of the ore, the car equipment has been improved. With the decrease in the flow of water mining conditions are immeasurably improved. The value of the ore, which is a clean sulphide, lies chiefly in its silver content, with appreciable quantities of gold and lead.

Strike Made in Judge Mine

In a raise from the 900-foot level of the Judge property in the middle vein system, a deposit of mining size and value has been encountered on a new horizon of a fissure which on other levels has been very productive. During the last 40 feet of progress in this two-compartment raise, now up 150 feet above the 900-foot level, the ore has opened up to a width of from four to five feet. Samples show that the average content of the ore is about 35 per cent lead and 35 ounces of silver, according to Mr. Lambourne. With any round of holes the limestone contact is expected to be broken into, where the management is confident even more interesting conditions will be discovered.

On the 1700 and the 2100 levels of the Daly West exploration work is being undertaken in unexplored blocks of ground which, it is thought, have great potentiality. In several places this work has already resulted in the opening up of substantial exposures of ore.

In the Daly property much important work has been accomplished in the way of preparing for development of the lower part of the formation, which in other adjoining properties has been richly productive, but which in the Daly mine has not been as yet explored. The improvement in labor conditions, which has permitted the undertaking of development work, for many months impractical because of mining costs, is a large factor, says Mr. Lambourne, in the improvement in the physical condition of the Judge Allied properties.

A REMARKABLE EXHIBIT

It sounds like a fairy tale but it is absolutely true.

One of the probable items in the exhibit of a far western state at the approaching American Mining Congress gathering at Chicago, will be five bars of solid gold worth in all just in excess of \$45,000.00.

This exhibit is not remarkable so much on account of its value as from the facts surrounding its production, which are these: This gold was taken from a surface trench about twenty feet long, six feet wide and at no part deeper than a man's height. The contents of a trench of this size is less than fifteen cubic yards, fifteen ordinary dump cart loads at \$3,000 a load—"some pay dirt!"

The writer saw this remarkable lot of gold at a local western exhibit and is making an effort to have it taken to Chicago as part of the National Exposition of Mines and Mining Equipment to be held in the Coliseum, Chicago, October 17-22; but the problem of its safe keeping has yet to be solved. It was shown under the protection of a team of Alaska Huskie dogs trained to watch anything left in their care and it is a question which attracted the greater attention, the gold or the dogs.

From this same state will be an exhibit of platinum of great richness. Of the more precious metals, platinum is really the most useful. More valuable than gold, it has properties that make it indispensable in certain mechanical processes, particularly in electrical equipment of high quality, and is largely used in the manufacture of jewelry.

Six thousand square feet of floor space will be devoted to exhibits of this character from six states and Alaska, the total value of which will run to over a million dollars. The guarding and safe keeping of this treasure is only one of the problems the show management has to solve.

BIGGEST STRIKE IN YEARS AT HORNSILVER

By A. J. Moore

Goldfield Nevada, Sept. 23.—It is the opinion of every mining man who has examined the developments at Hornsilver that one of the biggest strikes made in Nevada in years is at that camp, which is an hour's ride by automobile from Goldfield. Mining men are attracted to this strike not only by the extent of the ore bodies but by the high values.

The property of the Orleans Hornsilver Mining Company is the center of attraction because of its development and amount of ore exposed. The mine is open for inspection to all comers and many avail themselves of the privilege as they desire to familiarize themselves not only with the developments of the Orleans but to gain a knowledge of formations and character of the ore.

The Orleans Company has but recently taken possession of the property formerly worked by J. W. Dunfee who had been for some time playing a lone hand in the development of the claims. He had to depend entirely upon shipments to meet his payroll. It is said that he has shipped about 500 tons that gave returns of over \$60 a ton.

An incline shaft at depth of 600 feet is about 400 feet from surface in vertical line. From the bottom of this shaft Mr. Dunfee ran a short cross-cut. It had been his experience in working on the upper levels that the ore was to be found on the footwall side and he therefore expected the same condition to prevail on the 600-foot level. When he reached the footwall he began drifting along it northwest and southeast following the strike of the vein. He followed the footwall for a distance of 170 feet and then ran a short crosscut toward the hanging wall side. He had only gone a few feet when he broke into ore. He then turned southeast again and followed the ore for 130 feet. Near the end of his drift he upraised 35 feet and sank a 50-foot winze both of which were in ore of shipping grade.

D'Arcy Uncovers the Real Ore Shoot

Later A. I. D'Arcy, after securing control of the Orleans made a careful examination of all the workings. On the 600-foot level he noted that in the northwest drift the ore was at about the center between foot and hanging walls, also that the ore in the southeast drift was in about same relative position. He concluded from this that Mr. Dunfee had for 170 feet drifted right alongside of the ore body, only discovering it when he did by his crosscut north when in about 170 feet. A line drawn from the ore body in the northwest to that in the southeast ran parallel to but only a few feet from the Dunfee drift. This led D'Arcy to crosscut from the drift over towards the hanging wall. This was done at three points and each crosscut opened a fine ore body proving the D'Arcy theory correct.

The first crosscut opened six feet of \$26 ore and the second showed eight feet of \$20 ore while the third cut four feet of \$30 ore. It is estimated that the vein has an average of 26 feet with an average value of \$7 and the distance from the northwest point at which ore was taken to the face of the southeast drift is about 300 feet. It is one of the biggest ore bodies, considering its possibilities, opened in Nevada in many a year. As the top of the raise and the bottom of the winze are each in ore there is a height of 85 feet and neither top nor bottom in sight. As both faces of the 300-foot drift are in ore the length of the ore body is as yet undetermined. Some ore body.

New Ore Also Tapped on 150-Foot Level

During the short time that A. I. D'Arcy has been in charge not only has this ore body been proven but within

the past few days another ore shoot has been opened on the 150-foot level. This is at a point 125 feet southeast from the shaft.

Heretofore the timbers at the top of the winze on the 600-foot level have prevented the extension of the drift. These timbers will be removed and the level driven ahead. The shaft will be continued to the 700-foot level and the ore in the winze and along the ore shoot will be attacked from the 700-foot level. The raise will be driven through to the fifth level.

It is also the intention to fully equip the mine with modern machinery and appliances. It is said that the Orleans mine has in the past produced under various managements a total of over \$468,000 and worked under adverse conditions. The development work has been through two incline shafts. No. 1 shaft has never been extended below the 200-foot level while on shaft No. 2 no work has been done on the upper levels. A comprehensive plan of development is now being laid out and the mine will be fully explored on all levels and as occasion arises the No. 2 shaft will be sunk to depths below the 700-foot level.

ALASKA'S MINERAL RESOURCES.

Alaska possesses the greatest potential supply of natural wealth still remaining in an undeveloped condition among the possessions of the United States. Its mines, its timber and other resources are the reserves from which this country must draw in connection with the continued development of its industries.

Although Alaska since 1880 has furnished the United States with approximately five hundred million dollars worth of mineral products, the mineral resources of Alaska are still relatively untouched. This is even true of gold. Gold has been the great lure of Alaska and gold production still ranks first in Alaska's mineral output. Since 1880 Alaska has produced gold valued at \$319,669,947 and while the richest placer mine deposits have been exhausted, the possibilities of further gold production in Alaska are almost limitless.

In place of the placer mine of the prospector, there is now coming the large development in the way of dredging and hydraulic or lode operations, and it is reliably estimated that the lower grades of gold ore in Alaska will furnish much greater quantities of gold than the deposits which have already been worked out. Gold production, will, therefore, continue to rank as the mining industry of greatest importance.

Second in its importance as a mineral industry, in Alaska is the production of copper. During the last forty years, Alaska has produced \$126,826,096 out of a total mineral production of approximately five hundred million. As a matter of fact, only one great copper deposit in Alaska has been extensively developed. This development, the Kennecott mine, is one of the four largest copper producing deposits in the world. The other equally important copper deposits which are known and which have been surveyed in Alaska, will not be developed until additional transportation facilities have been provided, and these copper reserves will furnish one of the most important assets of the United States during the coming years.

In addition to gold and copper production, Alaska has rich mineral deposits of silver, lead, tin, antimony, platinum, chrome and many other auxiliary metals. In fact, Alaska is a great store house of mineral wealth and its development will take place with the adoption of a policy of constructive organization and development in Alaska on the part of the United States government.

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*Illustrated.

COMFORTING NEWS FOR METAL MINERS

It is comforting news to the metal miners of the West to read the market quotations on silver and lead these days. There never has existed much doubt that both of these metals must sooner or later command higher prices; the discouraging feature of the business has been the tardiness of the upward price movement in getting under headway. All of the news, both foreign and domestic, which has emanated from financial and commercial centers of the world during the month of September leaves no room to doubt that all silver will soon be commanding a price that will approximate, if it does not exceed, the 99¼c an ounce which the American producer now obtains from the government.

The peoples of foreign nations affected by the war are becoming extremely discontented over being restricted to the use of inflated "wall paper" as a medium of exchange and they are clamoring for something which represents some measure of intrinsic value—something which will find recognition farther away from home than the "corner bakery"—so they are beginning to reach out for silver, the only metal that will satisfy the craving of the masses of the common people of the world.

It is going to take many years to bring the production of the white metal back to a point where this craving and demand can be even partially satiated and met under most favorable conditions; so it behooves the American silver producer to hasten his efforts so that, as the demand increases and

the price advances, he will be ready to reap the harvest that his effort is sure to bring within his reach.

The fact also is becoming appreciated that the surplus of lead is diminishing rapidly to the vanishing point and that the price of this metal must advance to a considerably higher level than it boasts today. During the month lead has advanced in price along with silver. Unlike silver, there is no demand for this metal as a unit of value for money purposes. It simply is a commodity with a value regulated entirely by the law of supply and demand; and the fact that the price now is moving upward is a signification that the demand is rapidly increasing while the supply is not keeping pace. The future for both silver and lead is looking rosier every minute.

ENCOURAGE LEGITIMATE MINING

There has been more or less unfavorable comment over the passing of the third quarterly dividend by the Tintic Standard Mining Company last week. We are not familiar with the inside business affairs of the company and therefore we are not competent to berate the management and call names, as some self-appointed critics seem to take such delight in doing. The Tintic Standard, as we view it, is a great, legitimately conducted mining enterprise.

Through all the troublous times of the war and since—with excessive costs, almost confiscatory taxes, building of mills and railroads, sinking shafts and opening up new levels in the mine—and with metal markets in a more or less demoralized condition, the company has found a way to pay substantial dividends and make both ends meet. The record, it appears to us, is one of which the management has a right to feel proud and one that deserves commendation rather than censure. If there are still other problems to be met, and if the management feels that it is to the best interests of its shareholders to conserve its cash resources temporarily, why not accept the decision to pass a dividend with good grace?

At the present time we are all interested in building up—not wrecking—the metal mining industry. Legitimate effort on the part of those engaged in it should be encouraged. Peddling rumors, frightening stockholders and manipulating mining stocks is mighty poor business. There ought to be some way of suppressing the element engaged in this refarious practice.

From present indications it will soon be necessary for the state securities commission to issue another "clean bill of health" to George Graham Rice. A special meeting of the Bingham-Galena Mining Co. is to be held in a few days for the purpose of increasing the capital stock from 1,000,000 to FOUR MILLION SHARES. On the hypothesis that 1,000,000 shares are insufficient to meet the public demand, ANOTHER THREE MILLION SHARES ought at least to satisfy in part the public's overwhelming thirst for this "security." There is nothing like having a plentiful supply of shares in an undertaking—or "underwriting"—of such "potential" possibilities. A portion of the new stock, it is said, is to be used in the acquirement by the Bingham-Galena Company of a property in Idaho. In other words, the Bingham-Galena "fish pond" is to be restocked.

Our esteemed contemporary, the Nevada Mining Press, has deemed it prudent and wise to cease publication as a bi-monthly magazine and adopt the newspaper form. It is now appearing as a sprightly weekly publication, artistically made up and handsomely printed—and it is brim-full of high-class mining news, characteristic of its wide-awake editor, B. F. Spilman. The new plan makes it possible to handle legal as well as other advertising—and that will aid materially in the financial "editing" of the pay-roll. Believe you have hit the right trail, Brother Spilman. Good luck to you.

RUSSIA'S GOLD SUPPLY GONE

It is estimated by the Department of Commerce, on the basis of reports received, that the value of the gold in the possession of the Soviet government on August 1 was \$19,40,200, says a recent issue of Bradstreet's. The total value of the gold exported from August 2 to 10 was \$17,75,889, and it is estimated that the balance on hand on August 10 was \$1,264,311. At the rate at which the Soviet government has been disposing of its gold by shipment abroad for various uses, the stock of \$1,264,311 which was on hand nineteen days ago must virtually have vanished by this time.

The Soviet government has disposed of about \$175,000,000 worth of gold since February of the present year. The Russian government gold reserve at the beginning of the world war in 1914 was \$807,500,000. The Russian government sold \$330,000,000 of this gold to England for Russian credit abroad, with the important agreement that the gold should be returned to Russian use after the war. The old Russian government also shipped \$2,500,000 of its gold reserve stock to Sweden for credit during the war. Consequently the balance of Russian national gold reserve on hand at the time of the outbreak of the Bolshevik revolution was \$469,000,000, all that was left of the original stock of \$807,500,000.

Starting with this balance of \$469,000,000, the Bolsheviks received from other sources, mainly through confiscations, additional gold valued at \$177,000,000, so that the total amount of gold in the state bank in Petrograd in November, 1918, was about \$646,000,000. Out of this the Bolsheviks paid to Germany under the terms of the Brest-Litovsk Treaty as the first installment of contribution the sum of \$160,000,000. The Siberians also managed to capture \$330,000,000 worth of Russian gold. This left a balance of \$156,000,000 on hand in the possession of the Soviet government in the summer of 1919.

The Soviet managed to increase this amount by the recapture from Siberia, after the collapse of Kolchak, the sum of \$233,998,519 out of the \$330,000,000 which the Siberians had captured.

The Russian Soviet government also came into possession of \$215,000,000 of Roumanian gold which had been sent into Russia for safekeeping. Consequently the total amount of gold on hand in possession of the Soviet government at the beginning of 1920 was \$514,998,519.

The Soviet authorities, according to information in possession of the State and Commerce Departments, early in February of 1921 themselves reported that the balance then on hand amounted to approximately 350,000,000 rubles, or \$175,000,000. The difference between that sum and \$175,000,000 was not accounted for by the Soviet leaders, but it is known to American officials that a certain amount of the Soviet gold had been paid for these ceded territories of Russia, other amounts were used for the maintenance of Soviet agencies abroad, as well as for political propaganda, and that the balance had been distributed abroad as an attraction for trade and political relations with Russia.

TO EXHIBIT OIL SHALE AT CHICAGO

Sixteen members of the De Beque Chamber of Commerce arrived in this city late yesterday afternoon, says the Grand Junction Sentinel of the 17th, and met last night with the directors of the local chamber in an effort to secure financial assistance in making an exhibit of oil shales and their products at the American Mining Congress, to be held in Chicago October 17 to 22, inclusive. Such a

display would cost between \$1,000 and \$1,500, and the De Beque chamber asks that Grand Junction and Glenwood contribute one-half of that amount. Such a display would prove very beneficial to the entire shale district, hence the effort to have the various cities within the district share in the cost.

A considerable time was spent last night in a general discussion of the proposed exhibit. Any action on the part of the local chamber was put over until Monday night, when a meeting of the directors will be held.

Those in attendance last night from De Beque were C. G. Haley and F. E. Peirce, president and secretary of the De Beque Chamber of Commerce, E. B. Sucher, F. C. Hubbell, P. W. Palmer, C. G. Montgomery, J. C. Harris, P. N. Cameron, J. C. Hardison, H. D. Locke, secretary Mt. Logan Shale Co., J. C. Richards, president Overland Shale Co., J. E. O'Hare, Geo. W. Heflin, W. F. Ruth, superintendent Monarch Shale Co., H. A. Hansen, manager Index Shale Co., R. J. Meyn.

BUREAU OF MINES INVESTIGATIONS

Tests on the sulphur dioxide leaching of complex ores from the Miami district in Arizona have been completed at the Southwest station of the Bureau of Mines, at Tucson. It is considered that sulphur dioxide leaching is a demonstrated success on the most refractory silicious ores in the Southwest and also on ores containing a large percentage of acid-soluble gangue. The commercial application of the process appears to hinge largely upon the successful working out of the manufacture of sponge iron. Laboratory work is being done on Walker River silicious copper ore, which has soluble lime, iron, and manganese aggregating 10 per cent acid-soluble gangue. Results so far obtained are quite encouraging.

A new method has been developed at the Northwest station of the Bureau of Mines at Seattle, Wash., for the determination of metallic iron in sponge iron, which has been found to be more accurate, simpler and more rapidly performed than any of the existing methods.

Gold ores containing stibnite have been leached with alkaline sulphides at the Northwest station. A report covering all the work done on antimony at this station will be published at a later date.

Cooperative work by the Bureau of Mines and the University of Idaho on the theory of flotation is in progress at Moscow, Idaho. Some very interesting facts on the absorption of oil by minerals have been developed, which will be given later in a detailed paper on the subject.

Investigative work on the mill sludges of the Wisconsin zinc mining district is being directed by the Mississippi Valley station at Rolla, Mo. Work has been done on the tabling of sludges and fine tailings. The system of floating the sludge table concentrates has been simplified. The system of flotation has been changed so that the "oil rock" impurity can be more effectively removed than heretofore. Several series of tests on various sludges have been made by this improved system.

An investigation of various deposits of clay, mica, schist, slate, marble, talc and kaolin in Alabama, Georgia, Tennessee and North Carolina with regard to their suitability for use as mineral fillers is being undertaken by the Southern Experiment Station at Tuscaloosa, Ala.

OIL SHALE SITUATION TODAY IN THE UTAH-COLORADO FIELDS

By Victor C. Alderson.*

In the opinion of petroleum and oil shale men, whom I met on a trip through eastern Utah and western Colorado, the recent drop in the price paid for crude petroleum is only a temporary incident in the oil situation. The price of 50 cents a barrel for Wyoming Salt Creek petroleum, and corresponding low prices for Pennsylvania and Mid-Continent oil, is so ridiculously low and so far below the cost of production that the price must, in the very near future, be advanced.

Crude shale oil, obtained by retorting oil shale, cannot find a general market until the price of well oil is above the cost of producing shale oil. This cost has been conservatively estimated at \$1.85 a barrel, for mining and retorting. When the price of well petroleum approaches, or, better, exceeds this figure the production of crude shale oil will take on renewed activity. This will not, however, prevent the production of crude shale oil at the present time for specific purposes to which it may be especially adapted, e. g., the use of crude shale oil for oil floatation in the concentration of ore; also its use in the production of a "sheep dip" and in the manufacture of shale soap as is being done by the Shale Oil Company of DeBeque, Colo., and Hastings, Nebraska.

For such uses shale oil may bring a very high price, much higher than the price of well petroleum. The chief effect of the low price of well petroleum on the oil shale industry has been to reduce the price of oil shale land, curtail speculation, and eliminate wildcatting and illegitimate promoting. According to my observation the necessary assessment work on virtually all valuable oil shale land in Utah and Colorado has been done. Little or no worthwhile oil shale land will revert to the government because of failure to do the required assessment work.

The Wallace type retort of the Ute Oil company on the White river, fourteen miles from Watson, Utah, is to be completed by the Russell Engineering company of St. Louis. Work has been delayed by a controversy with the government over title to the land. On the bluff adjacent to the retort plant is a vertical bed of shale 200 feet thick from which shale will be mined and delivered to the retort. Outcropping on the banks of White river is a twenty-foot vein of oil shale, yielding on the average sixty gallons of oil to the ton, that has been traced for twelve miles. The new Bamberger railroad when constructed will pass close to the retorting plant. The Western Oil Shale company has completed, on their property nine miles from Dragon station, four ten-ton retorts of the Galloupe type. Here the retort is adjacent to a solid hill of oil shale so that mining costs will be at a minimum. J. H. Galloupe is erecting a retort in the Willow Creek district, forty miles west of Watson, for eastern capitalists.

The Reed-Doyle interests have secured patents on twenty claims on both sides of Evacuation creek. Captain M. W. Cooley of Mack, Colo., and associates hold 8,000 acres in the vicinity of Ute Switch, Utah, and 3,000 acres on White river. Receiver certificates have been issued on twenty-four claims and sixteen others have been advertised. W. A. Banks of Watson, and associates, have nearly completed assessment work on thirty-two claims and are preparing to go to patent.

Mayor C. E. Cherrington, of Grand Junction, and other leading citizens, realize that Grand Junction is well located to be the center of much industrial activity. A movement is well under way to build a road to the carnotite fields on the south and another to the Uinta basin on the northwest. These

projects will tend to make Grand Junction the business center for both carnotite and oil shale activities.

At De Beque the Ventura Consolidated Oil Fields company of California has established a camp for twenty-five men and has begun to diamond drill its property. This work will give exact information as to the thickness of each oil shale stratum, the yield of oil, and the total productivity of the entire area. The Index Shale Oil company is installing a Brown retort on Bount Blaine of 500 tons daily capacity. The mill building will be 100 feet long, 71 feet wide and 57 feet high. The construction is of concrete and heavy wooden timbers and substantial throughout. The engineering and technical work is under the direction of H. J. Hilton, a graduate of the Colorado School of Mines, and Chandler Weaver, a graduate of Lehigh university. H. A. Hansen, mayor of De Beque, a man of wide practical experience, is general superintendent. The Monarch Oil Shale company has erected a Ginot retort and has made nine test runs, the longest of which was for two days. Oil has been shipped in barrel lots for experimental use to the Calumet & Arizona Copper company, the American Zinc company, the Eagle Mining company, and to Columbia university, New York. The retort is of the stationary horizontal type, twenty-five feet long, three feet in diameter and gas fired from below. The shale is advanced by an internal arrangement of revolving flanges or "shovels." The daily capacity of the retort is estimated at fifty tons. The vapors are taken off through thirty-nine outlets at the top of the retort, are then combined and pass to the condensers. The shale is ground to one-half inch mesh and yields sixty-four gallons to the ton. The presence of water in the vapors is to be avoided by the installation of a preheater to evaporate, as far as possible, the moisture in the shale before the shale enters the retort proper. The shale stratum, eight feet thick, lies 1,000 feet above the retort. A tunnel seventy-five feet long has been driven into the shale bed with two twenty-foot drifts, one on either side of the tunnel. A four-inch pipe carries the shale from the crusher, at the mouth of the tunnel, down to the retort.

At Grand Valley Karl C. Schnuyler of Denver and associates are erecting, in Wheeler gulch, a complete mining and retorting plant, under the direction of George A. Taff of Colorado Springs. Concrete foundations and substantial timbering now under way indicate a well-constructed and permanent plant. The workable oil shale bed is 2,000 feet above the level of the gulch. A wire rope tram is now under construction and is about one-fourth completed.

The Union Oil company of California is carrying to patent 15,000 acres of land and Ray Eaton and associates of Denver 5,000 acres in the Parachute creek district.

AMERICAN SMELTING ADDS TO MEXICAN HOLDINGS

The American Smelting & Refining has acquired a number of valuable silver mines in the states of Chihuahua, Durango and Coahuila, according to the Bisbee Ore. The principal mines included in the purchase are those of Potrerillo in the state of Coahuila. La Esmeralda mine is one of the biggest producers. However, it has been idle for a number of years owing to various difficulties.

At a meeting of the principal mine owners and companies of these three principal mining states, held recently in the city of Chihuahua, it is said that arrangements were made to resume work at 31 of the big mines which have been suspended for some time. The principal mines and mining companies represented at the meeting were Los Tres Estados, Perlitas, Los Placeres and the American Smelting & Refining company.

*President, Colorado School of Mines.

In Nearby States

ARIZONA

The property of the Coronado Mining Company, in the Copper Mountain mining district, was sold at public auction in Clifton on September 26 to satisfy a judgment obtained against the company by the Arizona Copper Company, Ltd., in the Superior Court on August 31.

It is reported that the Gold Roads mine in the Kingman district, together with the big mill on the property will in all probability be put in operation this coming winter. Headquarters of the company in New York have been quietly making a survey of conditions locally, with a view of reopening the property.

The Miami Copper Company continues to produce about 4,000,000 pounds of copper a month, or 80 per cent of capacity. Current costs are estimated at around 11 cents a pound. Last year they were 11.89 cents a pound, but this included inflated "New York office charges," it is reported. The company markets its output independently at prevailing quotations, and at the beginning of 1921 had only 16,200,000 pounds of copper on hand.

B. Welte, Sacramento business man, stopped at Kingman recently, according to the Mohave County Miner, to look over the Gold Chain of which he is a heavy stockholder. Mr. Welte was on his way home from Hermosillo, Mexico. This was Mr. Welte's first trip here since the Gold Chain uncovered its 50-foot vein and he was immensely pleased at the showing of the mine. Mr. Welte is a mining man of many years' experience.

The Union Pass Mining Company has completed the work of surveying and platting its property in the Katherine section and work is soon to be put under way. The company owns 120 acres of mining ground between the Adams and Sunbeam holdings, besides fractions contiguous to the Gold Chain. A campaign of prospecting and development is to be soon started with Tom Kilker, the well known Oatman mining man in charge.

That the report of a big gold strike near Benson was a lure to create a rush to that section, is the word brought to Patagonia by mining men who went to the Hub City to make an investigation. They report that they learned on truthful authority that the reported strike was made by owners of several pretty good claims north of Benson on the east side of the San Pedro river, in order to create interest in the field.

COLORADO

The pump at the Smuggler mine has been taken out and the workings allowed to fill up.

Electric power has been turned on at the Bellevue-Hudson mine for the resumption of work.

The Burleigh mill, running on ore from the Pelican dump, has turned out twenty-four cars of concentrates since Mr. Cole took charge of it—an average of a car a week. Other mills would be in operation today were the same economical methods adopted. The stuff is in the dumps and more of it in the old stopes.—Georgetown Courier.

According to the Silverton Standard a raise recently commenced to connect the present working level at the Ariadne mine with a level about three hundred feet above, is showing fine ore as work progresses. A fine showing of copper ore of a shipping grade, over a width of eighteen inches, was

found thirty feet above the level. The vein is showing values in lead and silver ore in addition to the copper.

The Atlas Mining and Milling Company has just received and is installing a new 20-ton filter press, indicating an extension of the usual progressive methods of this company. The Atlas has been gradually increasing its force, until at present the company has about ninety men on its payroll. For several years the Atlas has been the principal encouragement to the business interests of Quincy, on account of its payroll being the largest in the county.

The Metals Tunnel Company, which has extensive mining property on Chicago Creek, about seventy miles from Idaho Springs, and also on Clear Creek, near Georgetown, is confining its operations at present to the Georgetown property, known as The Denver Tunnel. On this tunnel it is working sixteen hours a day, in two eight hour shifts. The company is backed by abundant eastern capital, chiefly in Michigan and Ohio, and is frequently visited by stockholders.

IDAHO

Assays of ore taken from the Troy mine, across the line in Idaho, owned by A. E. Dorsey and other Troy men, show values of \$179 to the ton, \$77 in lead, \$3 in gold, \$91 in silver and \$4 in molybdenite.

The retiring board of the Idaho Gold & Ruby Mining Company was reelected at the annual meeting of stockholders, held recently at Spokane. The board is comprised of J. M. Schnatterly, president; M. L. McCormick, secretary treasurer and A. B. Babb. "Development for the year has cost approximately \$150,000, of which \$70,000 has been paid in cash," said J. M. Schnatterly, in the course of his report. "The rest of the sum is to be taken out of the earnings of the company, in accordance with agreements entered into with the employees. Eighty men are now employed and more will be taken on as needed."

An ore discovery that appears to rank in importance with any made in years in the Pine creek district, of the Coeur d'Alenes, has been made by the Pine Creek Mining & Milling Company, operating on the old Hilarity mine, according to late reports. The ore has been followed for 100 feet in length and crosscut for 18 feet. About four feet of the vein matter on the footwall side is of high grade and the remainder of the vein filling is milling ore. A drift is proceeding on the footwall streak, assays from which show 15.2 per cent lead, 5.6 ounces silver and 7 per cent zinc, while hand samples of the mill ore show 14.1 per cent lead, 3.2 ounces of silver and 2.4 per cent zinc. The outcrop of the vein consists of an iron carbonate cap at least 30 feet wide and extending 1000 feet ahead of the present face of the tunnel. A depth of 750 feet will be attained by the tunnel in following the vein. A compressor plant will be installed in the near future. The claims are being surveyed for patent. The company is a reorganization of the Hilarity Company. Its property consists of 14 claims in Denver gulch. In addition to the mineral resources the claims embrace one of the largest stands of merchantable timber on Pine Creek.

MONTANA

The Bryant mine, one of the Philipsburg Mining Company properties, resumed operations early in the month under contract. Ed Hill is in charge of the property.

It is reported that a vein of high-grade ore has been struck in the Glengarry mine at Cooke City recently. The Cooke City district is in the neighborhood of the Scotch Bonnet

Mining Company, a property of large area, owned by residents of Spokane, and active many years ago. The Glengarry Company has veins on the surface that were 14 to 26 feet in width. Its owners wanted to determine the volume of the ore so they ran a tunnel to reach the vein almost 400 feet beneath the apex.

After 30 years of inactivity, work is to be resumed on properties of the old Rock Island mine, six miles north of DeBorgia, now known as the Silver Rock, according to Chris Ehrenberg, manager of the Palmerston hotel, Spokane, Wash. "During early years valuable deposits of silver and lead were found in the old mine," said Mr. Ehrenberg. "Thirty years ago three tunnels were driven, but none had reached the ledge. During the summer the new company, composed of eastern capitalists, has been building three miles of road, enabling ore hauling to DeBorgia. Several bridges have been constructed."

A few years ago E. E. DeSnell of Santa Barbara, California, discovered an amethyst deposit in Montana, about 25 miles southeast of Butte and he has since been giving his attention to mining and marketing the precious stones. The stones are found in a ledge or blowout about 8 feet wide and between granite walls. The gems are found distributed through the vein generally in a breccia formation with more or less quartz or spar. The stones are mined by the use of bars and wedges, as it is evident that it would be impractical to use explosives.

Operations at the Green Mountain Company's silver property, 15 miles west of Anaconda and just beyond the Blue Eyed Nellie, have progressed so successfully that arrangements were made to truck the ore to the smelter for concentration, according to H. J. Beartown, president of the concern, who spent a few days in Anaconda recently making arrangements for the shipments. The company has four claims on which discovery was made last spring of the ore body, which Mr. Beartown declares is producing good shipping grade ore. This vein was discovered very near the surface and averages 12 inches in width. It has been followed 300 feet by tunnel and, according to the president, is growing wider. Mr. Beartown has been prospecting in this vicinity for a number of years.

Montana operators announce that they can supply rock phosphate in vast quantity. "The Philipsburg and Maxville fields, owned and controlled largely by the Montana Phosphate company of Spokane, according to J. T. Pardee, United States geological survey engineer, and several other engineers of note, have one of the largest single-bed rock phosphate deposits in the world," said J. Fred Russell, president of the company, a few days ago. "The government survey engineers and other engineers of note estimate the tonnage in these beds to be approximately 70,000,000 long tons, above water level, and the deposits are believed to extend at least 1500 feet below water level. Adjoining these beds is a mountain containing millions of tons of the highest grade of lime. Several bulletins have been gotten out by the United States geological survey department on the extent of these fields. The analysis shows an average 60 per cent tricalcium phosphate, an unusually high grade, which will be cut at about 300 feet from the portal of the tunnel. The new tunnel will give 350 feet additional depth to the property."

NEVADA

The 150-ton flotation mill of the Simon Silver-Lead Mines Co. is expected to begin operating about October 15, when the power transmission line that is being built by Mineral county

under the direction of Engineer Joe Beane will be completed to the district.

The Spruce Monarch, which tapered off its production after shipping heavily all of last year, is sending about four 50-ton cars a month to Salt Lake smelters and is steadily increasing the operating force and adding to ore reserves. Shipments are confined to the ore extracted in development work. The company is controlled by Badt Brothers of Wells, Nev., and Salt Lake men.

Operations at the Hamburg mine, at Pioche, now under lease to Campbell and Lamb is proceeding most satisfactorily and steady production is in prospect. The ore recently struck is adjacent to the raise which was put up by the Hamburg Company and the deposit has now widened and gives every indication of developing into a permanent ore body.

The sweeps mill of the Tonopah Belmont Development Company, with a capacity of about 30 tons daily, was brought into commission during the month, and will be operated on tailings from the slime ponds. Ben D. Luce, the silver farmer, has in the neighborhood of 1500 tons of material awaiting treatment, and is now at work in preparing his second crop, which will be harvested before the extremely cold weather arrives.

That a cyanide mill will be built to treat the ores of the Big Chief Consolidated mines in Gold Circle is now considered certain, following a visit and thorough inspection by Clarence J. Berry, California oil operator and principal owner of stock in the company. Berry was accompanied by George McKenzie, San Francisco mining engineer, and David Ewing of Fresno, who is associated with him in all his business ventures. They spent several days at the mine, most of the time underground.

Dr. Walter Harvey Weed who recently examined the Virginia Louise mine at Pioche for eastern stockholders reports 1,318,750 tons of possible ore. This estimate does not take into account the possible amount or value of the ore beds recently opened up on the 833 foot level of the Prince mine, nor of the rich zinc ores shown by diamond drilling to exist on top of the quartzite series. The speculative value of these beds is quite large and may easily double the value of the Virginia Louise mine.—Pioche Record.

With a final investment of \$50, Peter Oslund, who made the Halifax famous, cleaned up in the last six weeks of his lease approximately \$25,000, and now is arranging to take his wife and child with him to Sweden for the winter before returning to Tonopah next spring. Oslund, who leased with Fredericksen in the Halifax, which is down almost 1800 feet, put \$50 into a last blast after his partner had given it up as hopeless, and uncovered an ore body which proved to be one of the richest in the district. Under the terms of the lease he had but six weeks left, but during this time he took out ore said to be worth \$60,000, and netted in this short time about \$25,000 before he relinquished the mine.

WASHINGTON

The new mines laboratory of the University of Washington, at Seattle, was dedicated on the 24th with appropriate ceremonies.

Five or six boulders of lead, like those encountered in the Electric Point and Glandstone Mountain mines, have been encountered in sinking to a depth of 56 feet in the property of the Keystone Lead Mining Company in the Electric Point district, near Northport, according to Jesse M. Hall, vice president and Spokane representative. "The boulders are

of sulphide, while those found on the neighboring properties were carbonates," said Mr. Hall recently. "The shaft was started in a chimney of iron having an area of 30 by 60 feet at the surface. The shaft will be continued to a depth of 100 feet, where the chimney will be circled by a drift." The Keystone Company is owned chiefly by Pittsburg capital.

The region of South Baldy, east of Brown's lake, 25 miles north of Newport, is the scene of the greatest mining rush Pend Oreille county has experienced. Prospectors are plastering large areas with locations. On one of the claims a shaft has been sunk 25 feet. It is reported to be entirely in ore with no wall in sight. Assays have shown values of \$76 a ton in gold, but the principal content has not been satisfactorily identified and samples have been sent to be assayed. The discovery is attracting attention not only from Pend Oreille, but from the outside as well.

While looking over timberland in Stevens county recently, F. P. LaSota made a mineral discovery that contains silver values running from 150 to 370 ounces to the ton. "There is a good deal of interest in Colville in this strike," said A. R. Moore of Spokane, who recently returned from that county. "Mr. LaSota has been prospecting the ground and has uncovered a ledge that is eight feet wide. Coming into this, he discovered another vein about ten feet wide containing silver-copper values of \$37 a ton. He is making a wagon road and putting new buildings up and will at once commence developing the property. The property is 27 miles northeast of Colville and about 12 miles from Electric Point."

BRITISH COLUMBIA.

The McKay brothers have completed their second contract for shipping 4500 tons of ore from the San Poil mine.

The Knob Hill mine in Republic Camp is working 10 men and making regular shipments to the Trail smelter, stopping from its new 600-foot level. The values on this level are the best ever found on the main vein. Samples taken from the faces of the stopes run high in gold and carload lots average from \$25 to \$35 per ton at foreign prices of silver. The lessees of the Old Dominion mine in the course of development have shipped to the Trail smelter 133 tons of ore of good grade.

Coal Notes

The Denver and Rio Grande railroad, it is said, now is hauling an average of two hundred and fifty cars of coal every twenty four hours over Soldier Summit.

Bids on a thousand coal cars are being asked for by the Denver and Rio Grande Western, the first order for equipment since the new management took hold of the line. About 40 per cent of them are for Utah.

There is considerable talk of the Scofield Coal Company resuming operations soon at the Union Pacific properties up in Pleasant Valley. However, nothing definite comes from the general offices at Evanston, Wyo. The mine has been idle for several months.

F. N. Cameron, president and general manager of the Peerless, was at camp up Spring Canyon during the month. He is arranging for a much larger output this fall and winter. His concern has an increasing market on the Pacific coast and in the Northwest.

R. Y. Gibson, former manager and part owner of the Cameron Coal Company, was in Price from Salt Lake City,

during the month. Mr. Gibson and Neil M. Madsen are soon to begin further development of a large coal property between Scofield and Clear Creek. Included in the holdings is a lease from the government on a tract of land.

Construction Notes

C. W. Mitchell, general manager and principal owner of the Volcano group of mines in the Kimball district, Hidalgo county, N. M., announces that a 100-ton cyanide mill will be erected there this fall.

A compressor plant is to be installed in the near future at the old Hilarity mine on Pine Creek, in the Coeur d'Alenes, by the Pine Creek Mining & Milling Co., of Spokane, which now operates the property. Eighteen feet of ore has recently been opened up in the mine. Particulars of the strike are given in the Idaho news.

Samuel C. Foote of Lava Hot Springs, Idaho, has applied to the state engineer, of Utah, R. Elmer Caldwell, for permission to use one second-foot of water from spring "C," in Boxelder county, between Plymouth and Fielding, for medical, bathing and heating purposes. Seven miles of twelve-inch pipe is planned for the diversion of the water.

Reports from Nevada are to the effect that the management of the Big Chief Consolidated mines at Gold Circle contemplate the early erection of a cyanide plant to treat ores now being opened up. Clarence J. Berry, a prominent California oil operator, is the controlling factor in the company. George McKenzie, a San Francisco mining engineer, was recently at the property with Mr. Berry.

It is currently reported in Salt Lake that the recent trip of Union Pacific railroad officials to the wonderlands of southern Utah hinged on a big plan to build a connecting railroad line by way of Kanab and St. George to the Kaibab forest. The forest, it is estimated, takes in millions of acres of virgin timber. It is government owned land but includes much timber which should be cut if the future good of the forest is to be considered, it is said.

The Utah Steel Corporation, which recently increased its capitalization, has been granted authority by the state securities commission to sell \$1,000,000 worth of preferred stock at par (\$100) and give a bonus of one share of common stock, with no par value, with each share of preferred sold. This corporation, which now is turning out in excess of 6,000 tons of steel and iron product monthly, is preparing to enlarge and equip its splendid Midvale plant so that at least 30,000 tons of product may be produced monthly. Blast furnaces and much new equipment are to be added.

CHART FOR DETERMINING SHALE-OIL YIELD

Chemists who have had occasion to report the results of assays of oil shale will probably be interested in the alignment chart which has just been published by the U. S. bureau of mines. This chart, prepared by M. J. Gavin, L. C. Karrick, and J. J. Jakowsky, gives in simple form the relations between the weight and volume of shale and shale oil. By the use of the chart, it is easily possible to determine the yield of oil in gallons per ton of shale when the actual laboratory results are in terms of grams, ounces, or cubic centimeters. The whole operation consists of connecting two points on the chart by means of a straight line and reading the desired result without further calculation.

Around the State

Superintendent John Ellsworth, of the Judge Smelter, after a month's visit in Boston and other big cities of the east, returned home a few days ago.

The Alta Tunnel & Transportation Company's recent strike is reported to be improving all the time and it looks more and more as though the mine would develop into a second Cardiff.

It is understood that a sufficient amount of work has now been done to enable the Eureka Standard Company to patent its claims in the eastern end of the district. This ground is to the south of the Tintic Standard and E. J. Raddatz is in control of both.

The Big Cottonwood Coalition Mines Company has purchased the complete compressor plant which served the Iowa Copper Company's mines at Park City until the shut-down. The machinery now is being moved and installed at the mouth of the long tunnel of the purchasing company.

It is reported that two or three feet of ore carrying good silver-gold values, twenty inches of it assaying \$110 a ton, while a streak sampled up to \$125 a ton, have been opened in a new property in western Boxelder county at a depth of about eighty feet. The property is owned by the Silver Tip Gold and Silver Mining Company.

Considerable prospecting is being done over in the Blue Ledge district, and several locations have been made in that locality the past week. There is a mining boom heading direct for Park City district, that will attract wide attention and result in increased population and good times, says the Park Record.

Superintendent "Dick" Pelton informs The Record that some eighty seven leasers are at work in the Ontario, on all levels from the 900 to the 1800—all of them making better than wages, and some of them accumulating a big bank account. Work is being prosecuted on the 2000 level by the company, and report has it that conditions on that deep level are quite promising.

Imer Pett, mine manager of the Montana-Bingham property, says that the output of approximately 100 tons per day of low-grade copper ore to the Garfield smelter was being steadily maintained. The manager explained that the development work had also opened some ore of high grade, but so far not in large quantities. The Montana-Bingham Company is employing about seventy men and is one of the three companies in the camp of Bingham now conducting operations on any extensive scale.

Active steps are being taken by C. W. Wattis of Kanosh, C. D. Ray of Salt Lake and W. H. Smith of Smithfield for the opening and development of the Indian Red Paint mine, located near Koosharem in Sevier county. After examination by several experts this deposit of mineral paint, which is a deep red clay with an aluminum base and almost entirely free from silica, has been pronounced one of the finest in the United States, the material being of a quality much sought for by the large calcining concerns of the Pacific coast.

Some very rich ore is being mined on the 1100 of the King Coalition, and is only one place of many on the various levels where huge bodies of both first and second class ores have been uncovered, and which will largely increase the output when conditions are again normal, which will be very soon now. The new mill of this wonderful producer is nearing completion rapidly, the steel workers and riveters are making

things hum, and fast obliterating all evidences of the recent big conflagration.—Park Record.

On the 21st instant the Mammoth mine, at Tintic, which for several months past has been carrying on only a limited amount of work which furnished employment for about forty men, was closed down, the fires being pulled from beneath the boilers and all underground operations being stopped. High freight and smelter charges, coupled with the low price for copper, are responsible for the shut-down, according to Manager Earl McIntyre.

At the Water Lily shaft of the Chief Consolidated Mining Company unusually good progress is still being made by the sinking crew, says the Eureka Reporter. It was at this shaft that the Walter Fitch, Jr., Contracting Company broke the world's record for fast shaft sinking, sending the shaft down 427.5 feet in thirty-one days. For the month following the contractor's forces made 374.2 feet, or a total of 801.7 feet for the two months ending on the 15th of September. It is the intention of the Chief Cons. officials to continue sinking until they reach a point near the permanent water level. If the present progress can be maintained the shaft ought to reach its objective point within about two months.

Personal Mention

W. H. Emmons, the noted geologist and engineer, has gone to Manchuria on professional business.

A. G. MacKenzie, secretary of the local chapter of the American Mining Congress, moves his offices from the Boston building to 212 Kearns Building on the first of the month.

E. J. Raddatz, president and general manager of the Tintic Standard Mining Company, returned from a short vacation trip to California about the middle of the month.

Alton L. Dickerman, one of the best known mining engineers in the country during his active career, died at his home in Colorado Springs on the 15th. He was 71 years of age.

Charles W. Whitley, vice-president and director of the American Smelting & Refining Company, who was recently in Utah, is now on a tour of inspection of the company's properties in Mexico.

L. H. Rogers, who has been doing assaying at the Ramshorn property in Idaho during the season, was in the city for a few days early in the month for a visit at home previous to leaving for the coast, where he enters Stanford university.

Herbert Francis, an old-time Salt Laker and now of Tulsa, Oklahoma, was in town about the middle of the month greeting old friends and looking into the oil situation here. He is interested with Oklahomans in an electrical oil-locating machine which he is sanguine is destined to revolutionize the oil prospecting business. The machine, Mr. Francis states, is demonstrating its worth in some of the Oklahoma fields and eventually, he expects, it will be introduced into Utah.

Charles W. Davis, vice president and general sales manager of the Standard Underground Cable Co., Pittsburgh, Pa., died Sunday, September 11 in the Memorial Hospital, New York. Mr. Davis was well known in the electrical industry as an expert on the design, manufacture and installation of electric cables and accessories, and had contributed largely to the development of the art by his investigations and occasional technical papers, and by his many inventions dealing with improvements in methods of cable construction, installation and operation.

Petroleum Notes

The Arro Oil & Ref. Co. expects to have its 1,500-barrel refinery at Lewiston, Mont., in operation by the end of September. Most of the equipment is on the ground.

Contract for the gas pipe line from the Wertz, Mahoney dome, and Ferris fields in Carbon county to Casper to be built jointly by the Producers & Refiners Corp., and the Midwest Ref. Co., has been let to the Hope Engineering & Supply Co., of Mt. Vernon, Ohio. This company has done considerable construction work in Wyoming.

The Olympic Oil Co. is drilling below 600 feet on 26-49-61 on the Bonanza Dome in the Big Horn Basin on land held under a prospecting permit by M. E. Jesseph and associates, of Spokane, Wash. Drilling has been suspended by the Hallam and Miller interests, also operating on this dome, following an attachment of rig and equipment by several supply companies.—Wyoming Oil News.

O. W. White, state oil inspector and formerly with the Standard Oil Co., is in charge of improvements at the plant of the Alliance Oil & Ref. Co., at Thermopolis. The plant is being overhauled and ground has been broken for additional stills and tankage. The pipe line from the Warm Springs field is also being overhauled preliminary to being again placed in commission.—Wyoming Oil News.

A group of officials of the Standard Oil Company of Indiana were in Salt Lake recently on a visit of inspection to the Utah Oil and Refining plant. They came from Casper, where they inspected the Midwest refinery. The visitors were met by John C. Howard, president M. J. Greenwood, salesman-ager, and W. R. Wallace of the Utah Oil Refining Company. The Standard of Indiana recently acquired control of the Midwest Refining Company and a short time ago took over operation of the Midwest refining plants.

The largest and most freakish oil well of the year in Kansas is still holding the attention of the oil fraternity of the Mid-Continent field. It is Brennan & Wixon's No. 1 Lucas in the extension of 6-27-8, eastern Butler county, which started flowing at better than 3,500 barrels of fluid when it came in, stopped, started up again at its initial rate and is now making oil and water spasmodically. Leases are being snapped up around it just as in the old \$3.50-a-barrel days.

A lady subscriber from Poison Spider who conducts a first-class oil field boarding house, has found another cause for criticism of the oil company of which she is a stockholder in regard to allowing its employes to indulge in the piscatorial sport so frequently. She says in looking over a statement of the company, she notes where it bought a car load of "sucker rods" and is expecting to hear at any time of the management buying a few gross of reels, assorted flies, lines, creels and other fishing paraphernalia.—Wyoming Oil World.

D. B. Dow, assistant organic chemist, U. S. Bureau of Mines, has prepared a report on methods of blending natural-gas gasoline, giving the results of work done for the purpose of finding a blending material that could be produced more cheaply than 50-52 naphtha and which at the same time would give a product that could be blended with straight-run gasoline without raising the endpoint of the final product. Mr. Dow has also been working on methods for measuring vapor tension of natural gas gasoline blends. A method for measuring vapor tension that looks promising has been developed, although sufficient tests have not yet been made to demonstrate that it can be used to advantage by the natural-gas gasoline industry.

Word has been received from Lewiston, Nezperce county, Idaho, of the discovery of oil. The flow of oil was encountered in a well being drilled at a point on the Snake river

near Swallow's Nest, about five miles south of Lewiston by the Lewiston-Clarkston Oil and Gas Company. Mr. Patrick Gibbons, geologist of the company, made the following statement after striking the oil: "We are of the opinion that we have got into a large oil field. As to the quantity of oil expected, we are not in a position to state, nor at what depth the flow was struck. Whether we will install a pump or drill to the end of bringing in a gusher, remains for the stockholders of the company to decide. We look for the field to develop into a large one." The well is being drilled on the Washington side of the river.

CONCLUSIONS OF AN OIL-SHALE BUG

Oil wells exhaust themselves in a few years. The shale mountains of Colorado and Utah will not be scratched in many lifetimes, even if a hundred plants are continually operated turning out thousands of barrels of oil daily.

One hundred million dollars has been spent in the United States in the last year on oil wells that did not produce a single barrel of oil. That amount spent in oil shale treating plants would provide equipment that could turn out 200,000 barrels every day.

There are a hundred oil refineries in the United States that are not being operated. The pools which supplied them are exhausted. They are valueless except for junk. A shale retort built in the shale fields can operate forever.

The man who drills an oil well is betting from \$10,000 to \$100,000 that he will find oil. Sometimes he has an even break for his money. In unproven fields it is a hundred to one shot. In the oil shale industry speculation is eliminated.

Oil wells produce only oil. The shale mountains will supply many useful and valuable products which will more than pay the cost of shale treatment. The oil will be profit. It will cost the producer nothing.

Ground petroleum must be accepted by the producer as it comes from the well. Sometimes it is rich in desired elements. Sometimes it is only fit for fuel. Shale oil can be made to order. If it is desired to increase the percentage of the more volatile fractions it is simply a matter of adjustment or regulation of heat.

Railroads and pipe lines built into the shale fields can operate indefinitely. When constructed for newly discovered oil fields their tenure of life is limited. Oil shale towns will grow to be cities. Oil cities in time become abandoned hamlets.

When the shale deposits furnish the principal supply of petroleum there will be no rapid and disastrous price fluctuations. In times past the development of rich pools has flooded the market with cheap oil and ruined the operators. Shale oil can be produced only as needed.

The use of oil in recovering metals by the flotation process will create a demand for many thousands of barrels daily. Crude shale oil is ideal for this purpose and is now being sold and contracted for at the rate of \$8 a barrel. Well oil in some fields of the United States is selling for 50 cents a barrel and is useless for flotation.

The greatest shale beds are located between the Rocky

Mountains and the Sierra Nevadas, a region comprising one-third of the area of the United States and capable of supporting a hundred million people.

Oil companies are buying shale lands by the thousands of acres, but engineers and chemists sometimes express doubts as to the feasibility of producing and refining shale oil. Their doubts will vanish when the big companies have all the land.

Next to transportation and agriculture the oil business is the largest industry in the country. A revolution in its methods would upset many vested interests. Oil men are not anxious for the early development of shale. They are letting the little fellows do the pioneering, while they pick up the land.

By the use of the core drill and laboratory tests you can tell exactly how much oil can be recovered from a given acreage of shale deposits. Experts are now telling how much oil is still to be recovered from oil wells. They can not figure within five billion barrels. One man's guess is as good as another.—Shale Review.

NOMENCLATURE OF THE OIL GAME.

Under the caption, "Nomenclature of the Oil Game Made Easy," a recent issue of the Wyoming Oil World offers the following definitions of terms encountered in reading of operations in the oil fields, including expressions and opinions concerning things and individuals that do not often creep into print:

Bull Rope: The piece of hemp which is used to lead the cow hither and thither.

Crooked Hole: There have been many drilled but no driller ever drilled one.

Rig Builder: A man who can destroy more lumber than two railroads can handle.

Supply House: An institution for the delaying of the production of oil.

Driller: The greatest obstacle to oil production. He "used to own a couple of strings of his own." Favorite food is Mail Pouch.

Stockholders: Similar to sands in that it is necessary sometimes to go through two or three layers of them before production is secured.

Salt Creek: A beautiful shady brook with speckled beauties darting about in its cool depths and violets growing profusely along its mossy banks.

Newspaper: A periodical instruction sheet to inform operators what they are going to do tomorrow. For the prompt completion of many gushers truly, the typewriter is mightier than the drill.

Tool Pusher: He who is always about to "entirely cut out this d—— loaning and borrowing," and never does. He sometimes shows a slight indication of impatience and has been known to almost swear.

Geologist: The world's champion "crepe hanger." After looking over a supposed dome he invariably decides that as oil land it would make good sheep pasture, and expresses grave doubt as to the sanity of the person who said he found a dome at that point.

Taxi Driver: Very friendly toward cooks. Characteristic extracts from his entertaining (?) monologue: "pulled around him and then pulled him out," "thirty below and drove all night," "Yeah, sure, them big birds always have a bottle of real stuff along."

MINING IN WOODRIVER REVIVING

Confidence in mining on Wood river, Blaine county, Idaho, has returned during the present year to such an extent that more mining activity is being manifested than for a long period, according to Stewart Campbell of Boise, state mine inspector. "There is no wild excitement like that of the early days, but a quiet, steady growth evidenced both by new discoveries and by the taking over and opening up by responsible concerns of a number of the famous old producers," reports Mr. Campbell.

"Wood river undoubtedly has opportunities for prospectors and the number of discoveries that have been made recently in different parts of the district justify, in part, at least, their greatly increased numbers," said Mr. Campbell. "Two of the new discoveries appear to be very promising. One mine has a car of high grade ore in transit and the other expects to have a car out within a few days."

"That mining conditions are improving is evidenced by shipments for August, 1921, when more than 800 tons of high grade ore and concentrates were marketed, almost a car a day, with a net worth of approximately \$100 per ton, and by the extension of the power line of the Wood River Power Company from Richfield to Shoshone, where it will connect with the power lines of the Idaho Power Company. The Wood River Power Company has two large power plants, one at Hailey, the other at Bellevue, and heretofore the company has been in a position to furnish all the power required. That the extension of the company's line was necessary to meet the power requirements of the mining companies is indicated by the fact that they advanced a considerable part of the money for the construction of the line. With a number of prominent mining engineers and geologists investigating the district and with two important deals pending the outlook for further developments is very encouraging."

HIGH GRADE SILVER ORE IN STRIKE NEAR COLVILLE, WASH.

Spokane, Wash., Sept. 20.—The Old Dominion mine in Stevens county, eight miles from Colville, is the scene of what is regarded as the richest strike of silver-bearing ore made on the continent in many years, according to reports received at Spokane. The ore contains 1140 ounces of silver per ton, which is equivalent to \$1140 at the fixed quotation of \$1 an ounce. It lies in a body three feet wide.

The strike was made at a depth of 600 feet, which encourages expectation of its presence in a body of important dimensions. It was struck in the face of a tunnel driven 2150 feet. The values are reported to be continuous in the short distance the ore has been followed by drift.

Operations are being conducted by the Dominion Silver-Lead Mining Company, organized five years ago. The number of shares is only 10,000 and they are held chiefly by residents of Stevens county and Spokane. W. H. Linney, mining engineer, of Spokane, is president and general manager.

The value of the ore is said to exceed that of any of the early-day strikes in the property, which was located 36 years ago by the Kearney brothers, who made a fortune from their shipments. Its heaviest yield was to J. B. Dennis, of Spokane, who subjected the property to systematic development.

The mines of Arizona are foremost in their activities for the well being of their employes through accident prevention, health insurance, pensions, clubs, athletics, home purchasing plans and the thousand other devices that are designed to make men better satisfied with conditions.

United States Smelting, Refining and Mining Company

Buyers of

Ores and Concentrates Matte and Furnace Products

Terms quoted for smelting ores, also for concentrating ores containing low percentages of both lead and zinc, on application to the United States Smelting, Refining and Mining Company, Newhouse Bldg., Salt Lake City. Smelter and lead and zinc concentrating and separating mills at Midvale, Utah; Copper smelter at Kennet, California; Zinc smelter at Checotah, Oklahoma; Lead and zinc concentrator at Needles, California; Lead refinery at Grasselli, Indiana.

*Insecticides, Fungicides, Weed Killer, Poison Bait, For Sale by Our
Agricultural Department. Newhouse Building, Salt Lake City, Utah.*

SALT LAKE MINING STOCK QUOTATIONS

The range of the market from Sept. 12th, 1921, through Sept. 24th, inclusive. Quotations furnished by J. A. Hogle & Co., direct wires to all leading markets, 169 So. Main St., Salt Lake City, Utah, and ground floor of Eccles Building, Ogden, Utah.

Stock.	Open.	High	Low	L. S.	CLOSING		
					Bid.	Asked.	Sales
Alta Mich.						.02	
Antelope Star						.01	
Alta Con.		.01		.01		.02	1000
Alta Tiger							
Albion Cons.	.03	.03	.03	.03	.02	.04	1000
Ann. C. Mines							
Alta Tunnel	.10	.11	.09	.11	.11	.12	46600
Addie					.02		
Bullion					.02	.05	
Big Hill	.02	.02	.02	.02	.02	.04	4500
Big Cot. Coal.	.04	.05	.04	.04	.03		5000
Big. Galena	.10	.12	.06	.12	.11	.12	92000
Beaver Copper	.01	.01	.01	.01		.01	4000
Bay State	.04	.04	.04	.04	.04	.08	1000
Black Metals					.01	.05	
Cent. Eureka					.01	.03	
Colb Rexall	.18	.18	.17	.17	.17	.17	3500
Colorado Con.	.01	.01	.01	.01	.01		3500
Crown Point	.01	.01	.01	.01	.01		3500
Cardiff	1.07	1.07	1.02	1.02	1.00		
Croff							
Daly					1.25	2.50	
Daly West					1.50	2.50	
Dragon					.03		
Emma Silver		.01		.01	.01	.01	13500
Empire Mines						.03	
East. Prince							
Emerald	.01	.01	.01	.01	.01	.02	3000
Eureka Mns.	.03	.04	.03	.04	.04	.05	10000
E. Crown Pt.	.02	.02	.02	.02	.02	.02	24450
E. Tin. Coal.	.01	.01				.01	23000
East Tin. Con.						.11	
East Antelope							
Eureka Lily	.09	.13	.09	.09	.09	.10	20900
Eureka Bul.	.05	.07	.05	.06	.06	.06	24601
Gold Chain					.03	.06	
Hamburg Mns.							
Howell	.03	.04	.03	.04	.04	.04	7500
Iron Blossom	.16	.16	.16	.16	.15	.20	700
Iron King	.08	.08	.08	.08	.07	.09	3000
Judge M. S.							
Keystone							
Kennebec						.05	
Lehi Tin.	.02	.02	.02	.02	.02	.02	4500
Leonora	.02	.02	.02	.02	.02	.02	4000
Logger	.01	.01	.01	.01			1000
Lynn Big 6	.04	.05	.03	.03		.03	12000
May Day					.01	.02	
Mich.-Utah	.04	.05	.04	.05	.04	.05	35500
New Quincy	.06	.07	.02	.03	.03	.02	
Naildriver						.09	
No. Standard	.03	.03	.02	.03	.02	.03	7500
Opohongo							
Plutus					.15	.19	
Prince Cons.	.08	.09	.07	.06	.06	.06	63500
Pioche Bristol						.01	
Price Mining	.03	.03	.02	.02	.02	.04	5500
Provo	.03	.03	.02	.02	.02	.03	1200
So. Standard	.15	.15	.15	.15	.15	.16	500
Sells	.03	.03	.03	.03	.03	.03	5000
Syndicate							16000
Sil. King Coal	1.62	1.65	1.62	1.62	1.62	1.70	900
Sil. King Cons.	.80	.80	.65	.65	.65	.80	2300
Sioux Mns.						.07	
South Hecla	.30	.30	.30	.30		.30	100
Silver Shield	.08	.10	.06	.10	.10	.11	10500
Tar Baby		.01		.01			1500
Tintic Central					.01	.02	
Tin. Standard	1.97	1.97	1.60	1.85	1.82	1.87	48600
Uncle Sam						.01	
Utah Con.		.01		.01		.01	2000
Union Chief	.02	.02	.02	.02	.01	.02	1560
Victor Con.						.01	
Victor Mining					.01	.02	
Whirlwind							1000
West Toledo	.01	.02		.02	.02	.04	5000
Walker Min.	2.10	2.12	2.10	2.10	2.07	2.10	900
Woodlawn	.14	.14	.08	.09	.08	.10	6500
Yankee Con.				.02	.02		
Zuma	.03	.03	.02	.02	.02	.02	7000

IRON OXIDE FOR GAS PURIFICATION

When coal containing any considerable amount of sulphur is used in the manufacture of city gas for cooking or illuminating purposes considerable amounts of hydrogen sulphide are found in the gas produced, and it becomes necessary to get rid of this by some purification process. The purifying material most commonly used is iron oxide, but, while it has been in general use for this purpose for many years, exact information such as would afford a basis for the selection of the best oxide preparation for a particular case has been lacking.

A bulletin on the subject has just recently been issued by the University of Illinois. This bulletin deals with certain experimental work carried on at the University under the Illinois Coal Mining Investigations Co-operative Agreement with the object of obtaining more exact information with respect to certain laboratory and commercial preparations of iron oxide. A perusal of the description of the experimental work and the results obtained should enable any gas engineer to choose the preparation of iron oxide most suited to conditions at his plant, with considerably more certainty than has often been the case in the past.

Copies of this Bulletin No. 119 may be had without charge by addressing the Engineering Experiment Station, Urbana, Ill.

FOR SALE

2 Fairbanks-Morse Compound Duplex Pumps No. 18916—No. 18-915, 12-18-10-12. The valve areas are large. The arrangement of the water valves such as will give a very direct course for the water through the pump. They may be operated at maximum speed without shock or vibration and with perfect safety to all parts; equipped with large and deep stuffing boxes. The interior may be easily reached through ample sized hand holes. These pumps will stand constant working pressure of 160 lbs. per sq. in. Also 2 Llewellyn Type Hydraulic Type Passenger Elevators, complete, cheap. Address, Hotel Virginia, Long Beach, Cal.

ASSESSMENTS PENDING

Big Cottonwood Bonanza Mining Company, 1-5c. a share. Delinquent October 12. Sale day October 25.

Logger Mining Company, ½c. a share. Delinquent October 12. Sale day November 3.

Freegold Mining & Milling Company, 1-10c. a share. Delinquent October 10. Sale day November 1.

Silver King Consolidated, 10c. a share. Delinquent October 22. Sale day November 15.

Utah Silver-Lead Mines Company, ½c. a share. Delinquent October 13. Sale day October 30.

Western Monitor Mining Company, ½c. a share. Delinquent October 10. Sale day November 1.

ORE SHIPMENTS

During the two-week period ending on the 23rd, Park City mines shipped 3,249 tons of ore, as follows:

Judge Allied Companies.....	1,141
Naildriver Mining Company.....	140
Ontario Silver Mines.....	695
Silver King Coalition.....	1,273
Total tons	3,249

For the two weeks ending on the 23rd, the mines of the Tintic district forwarded to mills and smelters a total of 303 carloads of ore, aggregating 15,000 tons, as follows:

Tintic Standard	83
Chief Consolidated	71
Victoria	25
Eagle and Blue Bell.....	22
Dragon Consolidated	18
Iron King	17
Iron Blossom	15
Centennial-Eureka	8
Mammoth	7
Swansea	10
Bullion-Beck	7
Sunbeam	4
Gemini	6
Colorado Consolidated	5
Alaska	2
Tintic Drain Tunnel.....	1
Silver Park	2
Total carloads	303

METAL MARKET QUOTATIONS, SEPTEMBER 24

Silver	99 ¼c
Silver in London	41 ½d.
Copper	12 1-8 @ 12 1-4c.
Lead (New York)	\$4.70
Spelter (East St. Louis).....	\$4.25 @ 4.30

The Salt Lake Mining Review

VOL. 23 NO. 13

SALT LAKE CITY, UTAH, OCTOBER, 15 1921

SINGLE COPIES, 15 CENTS

Utah's Mineral Exhibit at State Fair To Be Shown at Chicago—Production Data



View of the Steam Shovel Workings of the Utah Copper Mine, at Bingham, Utah—a mine still in its infancy, and with a dividend record to date of \$114,758,642.50, a cash and bond reserve of \$10,000,000, besides millions of dollars' worth of unsold copper, all paid for.

As a result of the co-operation of state institutions, and particularly the state school of mines, University of Utah, greatly aided by the local representatives of the U. S. Bureau of Mines, the Geological Survey, mine operators and others, the mineral exhibit at the state fair last week was the most pretentious and interesting ever made. It was a great advertisement for the state and the mining industry. The exhibit

occupied a building of its own and it was visited by thousands of people during the week. Balopticon reproductions of colored photographs of all the larger mining camps, smelting works and other ore-treating establishments, together with many handsome views of Utah's scenic attractions were also featured and greatly enjoyed by the throngs. At the close of the state fair the exhibit was packed for shipment to Chicago,

where it will be featured in the western mining states mineral exhibit at the American Mining Congress gathering.

Utah's Mineral Wealth Eptomized

The department of metallurgical research, State School of Mines, University of Utah, issued a pamphlet for distribution at the fair. The data contained was compiled by Thomas Varley, C. C. Stevenson and W. Spencer Reid. For brevity, accuracy and comprehensiveness it reflects great credit on the authors. It is commended to the attention of all wishing to gain an accurate reliable insight into Utah's position as a mineral-producing state without having to read and digest lengthy descriptions. The Mining Review takes the following from the pamphlet with regrets for not having the space to reproduce it in its entirety:

Introduction—General Comparisons

The data presented in this pamphlet is prepared with the idea of bringing before the public a few of the striking features of the mineral industry of Utah. Perhaps some of the figures may seem surprisingly large; furthermore, when the sweeping statements are made that Utah has the largest smelting district in North America and that the largest open cut copper mine in the world is within her borders; a deep sense of pride and satisfaction for our state should be manifest.

A few general comparisons will give a more visual conception of Utah's relationship to that of the rest of the United States.

The area of the United States is 3,026,789 square miles, while that of Utah is 84,990 square miles or 2.81 per cent of its total area.

The 1920 population of the United States is given as 105,708,771 and Utah has 449,396 or 0.41 per cent of the United States population represented in Utah. Populace per square mile of the United States, 35.5 and Utah, 5.5.

Utah's Total Mineral Production

From 1865 to 1920, Utah has produced from her minerals, a wealth of \$1,290,391,261 distributed as follows:

Copper	\$444,151,355
Silver	312,277,729
Lead	217,398,212
Coal	122,803,970
Gold	100,375,349
Zinc	18,508,483
Clay Products	14,007,330
Cement	13,925,854
Salt	7,950,622
Asphalt	7,226,502
Stone	7,021,558
Potash	6,007,112
*Miscellaneous	18,737,085
<hr/>	
Σ 1,290,391,261	

*Miscellaneous includes: iron ore, manganese ore, antimony, gems and precious stones, natural gas, gypsum, phosphate rock, mercury, molybdenum, tungsten, bismuth, uranium and vanadium ores, sulphur, lime, sand and gravel, diatomaceous earth, arsenic, graphite, slate granuels, sulphuric acid, coke, fluorspar, mineral waters and petroleum.

Utah has the greatest metallurgical center in North America, and according to present information, the greatest in the world.

The three Salt Lake valley smelters—the American Smelting and Refining Company, Murray, Utah; United States Smelting, Refining and Mining Company, Midvale, Utah; and the International Smelting Company, Tooele, Utah, treated 4,430,000 tons of ore and concentrates in 1919, which

was nearly one-half million tons more than treated at Douglas, Arizona, which holds second place.

The smelting capacity of ten leading districts in North America in 1919, was as follows:

District	Tons of Copper Ore Treated	Tons of Silver-Lead Treated	Total of Ore and Concentrates
Salt Lake City, Utah.....	2,600,000	1,830,000	4,430,000
Douglas, Arizona	3,970,000		3,970,000
Anaconda, Montana	3,580,000		3,580,000
Cananea, Mexico	1,794,000		1,794,000
Clarksdale, Arizona	1,700,000		1,700,000
Butte, Montana	1,642,000		1,642,000
El Paso, Texas	1,200,000	380,000	1,580,000
Copper Cliff, Ontario	1,540,000		1,540,000
Gr. Forks, B. C.	1,400,000		1,400,000
Great Falls, Mont.	1,010,000		1,010,000

Utah Copper Company's Mammoth Production

Utah has the largest open cut copper mine in the world. 740 acres, porphyry copper—pits and adits.

20 steam shovels, 50 steam locomotives.

Bingham & Garfield Ry. Co.—113 miles of steam railway.

Magna and Arthur—36,000 ton concentration mills.

Magna—4,000 ton sulphuric acid leaching plant. Employs 4,500 men. Capitalization \$25,000,000.00.

Production

Tons of ore	91,769,600
Pounds of metal	1,561,000,000
Total values extracted	\$303,148,000
Paid in dividends	\$111,000,000

To date the Utah Copper Company has removed 200,000,000 tons of material, while in the construction of the Panama canal, 375,000,000 tons of material was excavated.

Coal and Oil-Shale

Utah is fast becoming an important coal producing state. This industry is in its infancy. It is estimated that during the fifty years coal has been mined in Utah, the total supply has only been depleted about one-half of one per cent.

Coal production since 1870—55,424,767 tons.

Estimated coal reserves—11,008,864,000 tons.

At present the United States is the greatest producer and consumer of petroleum in the world. In 1920 domestic production was 100,000,000 barrels less than consumption, which was about 543,000,000 barrels.

Underground oil reserves, it is estimated, will be depleted in about 25 more years.

Other sources for oil supply must be looked for, such as oil from oil shales. It is estimated that the shales of the Uintah Basin alone will yield over 42,800,000,000 barrels of oil, and over 500,000,000 tons of ammonium sulphate.

The number of individual stockholders on its books at the present time is the largest in the history of the United States Steel Corporation. The count, taken in connection with the mailing of dividend checks for the last quarter, revealed 106,723 names, an increase of 1,413, compared with the total for the previous quarter.

The reserves of lignite in the Nenana region, Alaska, are estimated by the United States Geological Survey to be nearly 10,000,000,000 tons, which exceeds by nearly 3,000,000,000 tons the estimate made a few years ago, on the information then available of the total quantity of lignitic coal in the Territory. The new estimates, which are very moderate, indicate that the quantity of coal available in the Nenana coal field is greater than that in all the other surveyed fields of the Territory.

OIL-SHALE MOTOR FUELS RATED SUPERIOR TO PETROLEUM GASOLINE

Data is beginning to accumulate touching the merits of "shale-oil gasoline," "shale motor fuel" and "shalene," designations applied to the "gasoline" produced in the various eduction processes used in the recovery and manufacture of the elements contained in the great oil-shale beds of Utah and Colorado, as compared with petroleum gasoline products as motor fuel.

J. B. Jenson, local mining engineer and oil-shale expert, was the first to come forward with a statement covering tests made along this line, in one of his special articles on the "Practical Aspect of Oil-Yielding Shale Deposits of the Western Slope," published in the Mining Review last spring and afterwards issued in pamphlet form. Mr. Jenson made his tests over two years ago.

Later J. H. Galloupe, another well-known inventor of an oil-shale-treatment process, also made tests covering several weeks' time which he, at request, described for the Mining Review, about the first of September, the idea at that time being to learn how his investigations compared, in results obtained, with those of Mr. Jenson.

Right on the heels of receiving Mr. Galloupe's data on the merits of shale-oil "motor fuel," came a communication from the Industrial Process Engineering Co., of St. Louis, owners of the Johns process, describing experiments conducted recently in St. Louis. As this communication ended with the statement that "the test was said to have been the first of its kind ever made," the Mining Review takes this occasion to show what has been done by each of the three investigators mentioned, because the information will certainly prove of some value to readers who are keeping in touch with oil-shale developments. Following is the information from St. Louis:

Results of Johns Process

A wine colored fluid, closely resembling grape juice in appearance, extracted from Colorado shale by means of the Johns process, established a new era for solving the problem of fuel for automotive transportation, in Forest Park, St. Louis, Mo., recently, by making a record with a large passenger touring car equivalent to 22.8 miles to the gallon.

The demonstration, conducted in the presence of representatives of automobile companies and of the Automobile Club of St. Louis, under the auspices of the Industrial Process Engineering Company, took the form of a comparative test as against ordinary commercial gasoline.

The shale oil gasoline was extracted from Colorado shale and was produced at the demonstration plant of the Industrial Process Engineering Company at Denver, Colorado. It contained about forty-five gallons of crude oil per ton of shale. George McD. Johns, son of George S. Johns, editor of the editorial page of the Post-Dispatch, a St. Louis engineer, is the inventor of the Johns process used in extracting the oil from shale.

The shale gas used in this test was not refined in any way, but was merely distilled by the crudest method. It yielded about 42 per cent gasoline which is about twice the amount distilled from ordinary crude well oil.

Two large Hupmobile passenger touring cars were used in the test, making two separate trips with each fuel, running at the same rate of speed, over the same course and without readjustment of the carburetor on either car when changing from ordinary gasoline to the shale-oil gas.

The results of the comparative tests were as follows:

Car No. 1, first trip, 1 quart ordinary commercial gasoline, 4.95 miles; 1 quart of shale oil gas, 5.7 miles; Car No. 2, first trip, ordinary gasoline, 4.7 miles; shale oil gas, 5.1 miles. Second trip, ordinary commercial gasoline, Car No. 1, 5.5 miles; shale oil gas, 5.7 miles; Car. No. 2, ordinary commercial gasoline, 4.55 miles; shale gas, 5.5 miles.

The course of the trip started and ended at the Jefferson Memorial in Forest Park. The test was said to have been the first of its kind ever made.

Galloupe Tests Also Favor Shale Motor Fuel

Mack, Colo., Sept. 1st, 1921.

Eidtor Minnig Review, Salt Lake, Utah.

Dear Sir: Replying to your inquiry with reference to the comparative efficiency of shale motor fuel vs. filling station gasoline of today; will state that I conducted tests at the plant of the Western Shale Oil Company covering a period of seven weeks, using the distillation product recovered from the crude until the Baume density reached 45, and found this product very satisfactory throughout, with a power and mileage efficiency 10% greater than obtainable by using filling station gasoline.

No effort was made toward making a clear or classified product, and the unsaturated compounds composing approximately 35% of the whole was used; however, this motor fuel portion was agitated with a simple chemical solution that effects a marked degree of stabilization of color, and of most import, prevents the separation of carbon.

This product did not cause what is commonly termed "loading" of carburetor, but instead, when "stepped upon" produced results "right now."

There was no more than the ordinary amount of carbon deposit in motor, and no "starting" trouble encountered throughout the tests and combustion gases were not obnoxious.

In addition to the motor spirit test, I also thoroughly tested lubricants made from shale-oil, and while not comparable in specific gravity, viscosity, etc., with the better motor lubricants, it worked very satisfactorily, indicating that shale lubricants apparently hold their viscous state longer under useage than others.

Yours truly, J. H. GALLOUPE.

Jenson's Account of "Shalene" Tests

In order to determine the different results between shalene and gasoline, a test was made about two years ago, at Liberty Park, Salt Lake City, by T. L. Allen of Coalville, Utah, R. M. Johnson, Geo. Hardy, M. A. Smith and Earl Hardy of Salt Lake. They used an Allen chummy roadster, carrying all of these people and all of whom are rather heavy men. A test had been made the previous day, more for curiosity than otherwise, but no accurate record was kept, so it was concluded to repeat the run the next day. The driveway around the outer side of the park was chosen inasmuch as it would give the same identical conditions for both motor fuels. The run was first made with ordinary gasoline, making 23.2 miles to the gallon. The spark plugs then were examined and were found to contain a coating of carbon such as is usually found on spark plugs in the ordinary automobile.

Shalene was next put into the car and after recording the mileage of the previous run, the five men again entered the car. It was intended to try the shalene under precisely the same conditions as the gasoline and no adjustment was made, to begin with, on the carburetor. After making several rounds it occurred to the driver that it would not be a fair test unless the carburetor was adjusted to the new

fuel and of properly increasing the air going into the carburetor.

They had previously spoken to the keeper of the park, stating that they wanted to make a test and asked permission to increase their speed, which is regulated there at fifteen miles per hour, but were refused. Consequently the car was driven at fifteen miles per hour. Immediately when the air was increased the car speeded up to a little over twenty miles per hour, showing that the shalene was capable of producing sufficient additional power to increase the speed of the car 25 per cent when the proper carburetor adjustment was made, indicating thereby that shalene possesses at least 25 per cent greater power than the gasoline. It is evident from this, that had the carburetor been properly adjusted to begin with there would have been a greater increase shown than there was. The car was throttled down to fifteen miles per hour and the run completed showing a mileage of 24.6 miles, as against 23.2 for the gasoline, being an increase of approximately 6 per cent.

The spark plugs were then examined, three of them being removed and the carbon which was previously found on them had been entirely burned off, showing that the new fuel, shalene, not only does not deposit carbon under proper carburetor adjustment, but that through intense combustion it is capable of consuming the carbon which has already been deposited upon the spark plug and in the cylinder.

This test was made only for the satisfaction of these people, themselves, and not for public demonstration purposes. Mr. Smith drove the car. There have been several other tests made, but I am unable to obtain the data at this time.

Test on Salt Lake County Road

About the middle of March, last year, a friend, J. W. McCarty, and myself, were discussing the test above referred to, and incidentally, the qualities of shalene compared with gasoline. For our own information, and mainly to satisfy Mr. McCarty, we took a gallon of shalene from our testing plant which had received one acid and soda treatment, but otherwise just as it came from the shalene fraction tap, and a gallon of gasoline obtained at one of the service stations. The gasoline was first carefully measured into the car and the shalene into a container. A two-gallon can of shalene also was taken along to come home on. An ordinary Ford runabout which is used at the testing plant was employed for the test and was driven on the county road running south from Salt Lake. When the Ford refused to go further on the gasoline, it was found that it had covered 18.5 miles. The tank and carburetor were examined and both found to be dry. The measured gallon of shalene was then put in and the car driven over the same road under the same conditions as formerly, making a record of 24.5 miles—an increase of more than 30 per cent in mileage by the shalene over that of the gasoline.

There is a bare possibility that in this case we secured gasoline below the average, as we had been in the habit of getting between nineteen and twenty miles per gallon with this car, instead of 18.5, as in this case. Assuming that the gasoline was below the average grade and taking twenty miles per gallon as a basis, we have an increase of at least 23 per cent in miles covered by the shalene as against the gasoline.

Similar tests have recently been made in London on shalene above referred to from the plant of the English Oilfields, Ltd., and it is interesting to note the similarity in results obtained there, with those obtained in this coun-

try. The company is recovering an average of 30¾ gallons of refined products, from the crude oil from each ton of shale, seven gallons of which, consists of shalene, or what is termed in England, motor spirit. After washing and refining, the English shalene contains 0.2 per cent of sulphur.

Test Conducted in London

Tests on the shalene were carried out by Dr. Hubert L. Lucking, F. I. C., F. C. S. (late chief chemist to aeronautical inspection directorate) and Mr. John Ward, with the following results: No. 1 English Oilfields shalene was tested against a well-known brand of No. 1 gasoline, and the mileage of Norfolk shalene was thirty-seven miles per gallon against thirty-three with the gasoline, being an increase of a little more than 12 per cent in mileage in favor of the shalene.

From these tests, then, we have an increase of 6 per cent, 12 per cent and 23 per cent in mileage in favor of shalene. Taking the average of the three, we get nearly 14 per cent. This means, as an illustration, that if a given number of gallons of gasoline will take your automobile 1,000 miles the same number of gallons of shalene will take it 1,140 miles. If a given amount of gasoline will carry your airplane 2,000 feet into the air, the same amount of shalene will carry it 2,280 feet in the same length of time. We find that shalene, when compared with the best gasoline, has more pounds to the gallon and more power to the pound, and will therefore become the power of the future.

NEW BOOKS RECEIVED

Study of Minerals and Rocks, a combined textbook and pocket manual, (second edition, completely revised, just off the press), by Austin Flint Rogers, Ph. D., professor of mineralogy, Stanford University; 527 pages, 578 illustrations, pocket size, flexible binding. Price, \$4. For sale by the Mining Review book department.

The first edition of this work was issued in 1912. In the interim the author has had ample time and opportunity—which has been fully taken advantage of—to bring into prominence and relief the more important factors entering into the studies comprehended in the title of the book. The thought behind the work embraced in the compilation of this revised edition is found in the first paragraph of the author's preface, when he says: "This work is intended primarily as a text-book for a year's study of minerals and rocks. While full enough for class work it is condensed enough for field work. There is decided advantage in using the same book in the field as in the class and laboratory." The work covers the entire field of mineralogy, including crystallography, blow-pipe analysis, descriptive mineralogy and determinative mineralogy. The arrangement and classification of the subjects treated upon makes this second edition of particular value as a ready reference work. This arrangement makes it possible to get at the "meat" of any problem without waste of time. Part I deals with the properties of minerals; Part II the description of important minerals and mineraloids; Part III the occurrence, association and origin of minerals and a description of some of the more common rock types; Part IV the determination of minerals. The book will be found of inestimable value to the student as well as the man in the field.

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REOPENING OF OLD MINES AT PIOCHE SHOULD BE PRITABLE UNDERTAKING

By E. C. D. Marriage, E. M.

The statement has often been heard that the great mines of Pioche have been worked out, and that, had any ore been left by the big operating companies, old time leasers would have later removed it. In point of fact there is more actual tonnage in the mines on the "Hill" now available than has been mined in the past. The great veins which constitute the principal sources of profitable ore are true fissures and should extend to great depth and while the changing character of the ore at water level precluded at that period the possibility of re'ntion by the old methods of pan amalgamation, present modern metallurgical processes would, under proper conditions of operation, render such ore commercially profitable.

The great Yuba dike, the porphyry vein of the old time operators, is a great mass of rock, 40 to 75 feet in width, thrust upward from below through overlying formations estimated by geologists to be over 14,000 feet in thickness, representing for the most part virgin territory, which properly developed has untold possibilities. The length of the dike is known to be at least ten miles long extending from east of the Alps mine west through the Yuba territory and the large area under the control of the Consolidated Nevada-Utah Corporation to the Stampede and Highland districts where capping renders further tracing impossible without deep development.

The old time operators, attracted as they were, by the marvelous richness of the net-work of fissure veins in the quartzite, gave but little attention to the influence of the porphyry dike on the ore occurrences of the Pioche district and it was almost at the termination of their activity that the relation to and possibilities of discovering rich ore adjacent to the dike was realized. Even after the opening up of the Yuba mine had demonstrated the presence of bonanza ore bodies at depth, little constructive mining work was accomplished and two crosscuts commenced from the Amalgamated Pioche No. 5 shaft and headed towards and with the purpose of reaching the porphyry dike at depth are still hundreds of feet from their objective and the great shaft, completely retimbered, at enormous expense, by the Nevada-Utah Mines & Smelters Corporation in 1906, is now useless, through lack of upkeep.

The great dike has only been developed to any great extent in the Yuba mine, from which it gets its name, and one shoot alone stoped from the surface to a depth of 1300 feet vertical, produced over \$1,000,000 from high grade ore, the second-class material bring left in place. The product mined assayed, according to the company's books from 60 to 300 ozs. silver. The second-class or milling ore has a present-day value of approximately \$25 per ton.

Another bonanza shoot was encountered by the early-day operators to the east of the main deposit and this ore-shoot was worked from the 1300-foot level to the tenth level without sign of diminution, when a sudden cave-in in the Yuba shaft stopped further operations. In all probability it is this same ore-shoot that is now being mined by W. D. Price through the Pacific tunnel which is one of the few available openings from which it is possible to develop and prospect the territory. Leaser Price has sunk a winze from the tunnel level to a depth of 200 feet, making a total depth from the surface of approximately 525 feet and recent work indicates that the discovery is an important one, in that the present character of the ore resembles closely the ore being mined below when the shaft cave-in interrupted operations.

The Raymond & Ely mine and adjoining Meadow Valley

properties can be said, without doubt, to have little developed fissure ore remaining above water level, but during the period of their operation produced \$20,000,000 in bullion at a reported net profit of \$5,000,000. The tailings from the mills treating the ores locally contained over \$4,000,000 in metal value at the time of the cessation of work at these famous mines. None of the rich veins in the Raymond & Ely and Meadow Valley mines have pinched out at water level, nor have they been lost through faulting. Reliable assay data taken from the lowest workings, under water for 32 years, shows rich ore in place which, with up-to-date equipment, could be mined at a handsome profit. Thus, with the certain continuation of the fissure veins to great depth and the wonderful possibilities of the development of the porphyry dike contacts, an evident opportunity exists for the profitable reopening of the great mines of the Pioche district.

CONSOLIDATED MAYFLOWER MINES CO. BEGINS GOLD MILLING OPERATIONS

Milling operations were to have been started in the Mayflower mill, at Pioneer, Nevada, early in the month. A large tonnage of milling ore has been placed in sight in the workings of the Consolidated Mayflower Mines Company and ten stamps are now understood to be in operation, all recovery being made by amalgamation.

Mining and development will be carried forward on the various levels of the mine through the main working shaft and also at a point 1400 feet northwest of the main working shaft, where a tunnel has been driven into the hill for the purpose of developing what is known as the Starlight vein on the north end of the property.

The Starlight vein has recently been cut by the tunnel, the vein showing a width of 15 feet. Air for both workings will be furnished from the main working shaft from which point an Ingersoll-Sargent air compressor with a capacity sufficient to operate ten power drills will be in operation.

At the Pioneer mine, a close neighbor of the Mayflower, the main working shaft has reached the 800-foot level. At this point the permanent water level has been found and the shaft has entered a sulphide zone. Crosscuts will now be driven out under the ore bodies that have produced a large tonnage of shipping and milling ore on the upper levels.

These properties in the past have produced about \$1,000,000 in gold and evidently now are about ready to repeat the performance.

PRINCE CONSOLIDATED INCREASES CAPITALIZATION

Increase of the stock of the Prince Consolidated Mining and Smelting Company from 1,500,000 to 3,000,000 shares with a par value of 50 cents instead of \$1 was voted by stockholders of the corporation on the 10th instant.

Besides increasing the capitalization of the company, stockholders authorized the issuance of bonds valued at \$300,000 against the company's property. These steps were taken by the company in order to finance operations at the property at Pioche.

Officers of the company, chosen at the meeting, which followed the annual election on the 7th, are Anthony H. Godbe, president; George F. Wasson, vice president, and M. C. Godbe, secretary, remain unchanged. Plans for the sale of the bonds, which carry a stock bonus, are maturing and will be announced soon, according to Manager Godbe.

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COME OUT INTO THE WEST.

Fifty years or more ago, after Horace Greeley had been bumped and jostled over the old mountain passes and across the boundless plains, prairies and deserts in Concord coaches; after he had made and enjoyed the acquaintance-ship of the famous Hank Monk, who whirled him through the mountains at break-neck speed toward the bonanza mining camps of Nevada, and who, when Horace entered protest at his apparent recklessness, called back from his high perch on the "boot" of the coach, "keep your seat Horace, and I will get you through safe and on time," the noted journalist returned to New York and issued this admonition: "Go west, young man, and grow up with the country."

Next week there is to be a great gathering of mining men from the West at Chicago—men who are going to attend the twenty-fourth annual convention of the American Mining Congress and who, at the same time, are going to participate in an exhibition that will be illustrative of the progress of the mining industry since the days of Horace Greeley. On their behalf and in behalf of those whose investment and commercial interests suggest a change in the field of human endeavor, the Mining Review extends an invitation to come out into the West and investigate the prac-

tically limitless opportunities which still are open to those who would welcome a field in which there is ample elbow-room in which to expand and more than duplicate the achievements of those who have made their names and fortunes in the past.

With all of the tools, machinery and devices, methods of mining and the reduction of metalliferous ores which are now at the disposal of all who may hereafter enter the mining industry, visitors at Chicago next week may become thoroughly familiar. Also they can learn why, with the facilities now at hand, they may reap substantial reward from undertakings which, even a few years ago, might have proven unprofitable.

It has frequently been claimed that the gold, silver, lead, zinc and copper mines of the West are "worked out." Nothing could be farther from the truth. Neither have the mines of yesterday been worked out, nor has the limit of new discoveries been attained by any means. There are hundreds of mining districts and camps in the West where fortunes in so-called high-grade ores have been made which to-day are ready to respond to the application of up-to-date methods and up-to-date equipment by up-to-date mining and mechanical engineers, metallurgists and chemists, whenever the investor is ready to take a hand in their reclamation. There never has been a time in the history of metal mining when the opportunities for acquiring proven properties of this character were as numerous as they are today. And there never has been—and there never will be again, in all human probability—a time when mining properties that can stand rigid examination, could or will be obtainable on such advantageous terms as may now be secured. Already the search for this class of mining investment has begun; and it is certain to grow apace with the months immediately ahead. There will be many men at Chicago from the metal mining states next week who can substantiate what is outlined here—many men who will be willing, without personal motive or hope of personal gain—to point out the paths which will lead to opportunities worth while. The mining West is full of them. So, COME OUT INTO THE WEST.

France's contingent on the Rhine has been reduced to 85,000 officers and men. The British contingent is estimated at 4,000 effectives, as compared with 8,000 in the American area. For what purpose are these 8,000 Americans being kept away from home?

The recent airing of Bingham Galena-George Graham Rice-Child, Barclay & Co.-Heber C. Hicks stock manipulation affairs before the State Securities Commission, has had a tendency, at least, to serve warning on the public as to what has resulted and what may be expected to happen when "investors" get into the clutches of such "skin 'em right" combinations.

What with the reception and entertainment of H. Foster Bain, director of the United States Bureau of Mines, Congressman Marion E. Rhodes, chairman of the committee on mines, Senator Key Pittman and others, the mining men and mining engineers of Utah have been experiencing strenuous times since the middle of the month. Meetings of mining operators and engineers at which ways and means of furthering the best interests of the metal mining industry, now rapidly getting back into its stride, have been filling in the gaps. Everything said and done has had a direct bearing on the problems affecting the industry and much good has been accomplished through awakening wide interest. Everybody is getting busy.

DEATH OF CHARLES W. WHITLEY

Western mining and smelting circles were profoundly shocked Sunday last when the news came over the wires from New York that Charles W. Whitley, vice-president of the American Smelting & Refining Co., and for years general manager of the company's Utah plants, had succumbed to an attack of double pneumonia. Only a few weeks ago Mr. Whitley was in Salt Lake looking after company and personal business affairs. From here he went down into Mexico, looking into the smelting situation there.

As president of the Utah Steel Corporation, which very recently increased its capitalization and began maturing plans for largely increasing its plant and becoming one of the



CHARLES W. WHITLEY

biggest institutions of the kind in the country, Mr. Whitley's aid in rounding out the undertaking was expected to be invaluable.

In addition to his other interests Mr. Whitley was identified with the American Smelters' Securities Company, and director of several banking companies in Utah. He was a member of the Bankers' club, the Sleepy Hollow Golf club, the Engineers' club and the American Institute of Mining Engineers in New York, and of the Alta, Country and Commercial clubs of Salt Lake.

To be called so suddenly at the age of fifty-two years—in the prime of his manhood and mental capacity—is a great blow to his family and his friends and business associates in the West.

AN OPEN LETTER

Salt Lake Mining Review, Salt Lake, Utah.

Gentlemen: For a long time we have been systematically fed on pessimism through the press, postal channels, trade organizations, the banks and our friends, all trying to prove in one way or another that business, particularly our business and that of the government, has the mollygrubs, doddles, doldrums or what not. Frankly we are sick of the diet. The "worm has turned." The time honored "silver lining" to the cloud is getting so hefty that pretty soon it's going to turn that old cloud foreshadowing to. You know it and we know it. Then why the mollygrubs?

Now don't call us "nuts" or some other post-war pet name because we've cut out the pessimism. We are losing a little money, so is everyone else. We knew we were going to lose it, so let us be good losers. Whistle! It's better for the community. If things are not exactly lively in business and we don't know just what to do next, remember the fellow who had hold of the grizzly's tail. He had a near-up problem, fully equal to yours and ours, but history does not say anything about his having let go.

There's lots of business to be done; it's just around the corner. Why not go after it and help get things started. Try smiling. Attempt a joke if it does sound a little thin and hollow. It may provoke somebody to laugh or smile at your temerity. Laughs and smiles are what we want now. Cultivate the bacillus "Cheerfulness." Get out your forgotten warm handshake that used to stir the cockles of your friend's heart. Let us walk around like we had something important to do. What are we afraid of anyway? Bugaboos or goblins? Riley's story about goblins was for little "Orphan Annie"—not for business men with a world's problem.

If we have failed to do our share in adjusting prices and wages to where we know they must go, let us do it now—deflate—for "we are going over" and there is no room for slackers or profiteers but plenty for the real "American," the finest title in the world.

Give Harding a chance. His politics don't matter. He is President of the United States of America, the greatest country on this old terrestrial globe. Give him a square deal. Give congress a chance. Get out the constructive ideas that we have a grasp on, and fire them along to our congressmen and senators. They are human and will like it. It will help the country.

Give the Stars and Stripes a chance to flutter in a real American commercial breeze. We know how! Lets go!

Yours very truly, SMITH, EMERY & CO.

San Francisco, Oct. 10, 1921.

AMERICA'S GOLD STOCKS

The best interests of the United States demand that the inflow of gold from Europe which has occurred since the beginning of the great war shall be reversed at as early a date as possible, in the opinion of Dr. H. A. E. Chandler, economist of the National Bank of Commerce in New York, in the October issue of the bank's magazine, Commerce Monthly. America's proportion of the world's monetary stocks is now sufficiently abnormal to cause apprehension, he declares, and her gold policy should be constructed with a view to facilitating a movement in the opposite direction.

"A review of the available data in regard to the future needs of Europe clearly leaves the impression that her approach to normal conditions may require monetary supplies considerably in excess of her present combined holdings,"

Dr. Chandler says. "For this excess she must call upon the outside world and especially upon those few countries that now hold a disproportionate share. Among the holdings of these countries those of the United States overshadow all others."

In the light of these facts, "renewed interest attaches to the duration of the present influx of gold and to the time when the return flow to Europe will set in. These questions are of particular significance because of the possible effect that the gold movement may, in the meantime, have upon conditions in the United States and upon world trade."

"The question as to when the return flow will set in is partly concealed in the intricacies and uncertainties of the relative trade balance relationships of the several nations. It depends in part upon the world trade revival and the ability of European nations to establish favorable trade balances. It is interesting to note, however, that European economists and financiers do not attempt to conceal their pleasure at seeing the gold flow to the United States. They reason that no people could resist the temptation of inflation in the face of such a flow; that such an inflation will render American goods relatively high in cost and therefore further reduce our merchandise exports; that on the other hand Europe's goods will become relatively lower in price and therefore increased exportation from Europe will result.

"Indeed Americans who have given careful thought to the present gold influx with reference to inflation and the possible disturbing effects upon industry are apprehensive as to the results. If it is true, as careful investigation appears to indicate, that there is a tendency for an increasing percentage of the total commercial bank loans in the United States to take the form of fixed capital investments any considerable extension of credit upon the basis of the new gold would present a problem of very great importance.

"The question of Europe's need for part of our present supplies of gold does not necessarily wait upon her ultimate recovery or the complete adoption of the gold standard. As fast as one country after another approaches the condition when stabilization of currencies can be considered, an increased need for gold may occur.

"While it is true that the return flow of the gold is not imminent and that a considerable period may lapse before Europe can effectively demand any important part of our gold, it is much to the interest of the United States to have these gold reserves returned as soon as Europe can utilize them. With these facts in mind our gold policy should be so formulated that as fast as needed the gold may be returned without causing embarrassment either to Europe or to the United States."

SILVER KING CON. SHOWING IMPROVES

The Spiro tunnel workings of the Silver King Consolidated at Park City are reported to have excellent showings of ore in the west face of the iron drift and in the southwest drift on the 275-foot level above the tunnel.

The ore in the Iron drift has just come in. The management thinks it evidently is an extension of the shoot opened on the drift above which was abandoned on account of water. There the ore was three feet wide and was said to be very rich in silver, copper, lead and gold, assaying about \$300 a ton.

Similar rich ore was entered by the southeast crosscut on the 275-foot level about two weeks ago. In this heading the ore streak was drifted on to the southwest. It appears

to be bedding out from a fault-fissure and looks very promising.

The main tunnel has just penetrated a porphyry dike having a selvage of vein material on one wall and a mineralized fissure running in the middle of it. The cutting of the D. & M. fissure in a few rounds is considered very probable. Then a few weeks' work will bring the bore into the Comstock dike which, for the present, is the final objective of the tunnel.

SOUTHERN UTAH OIL COMPANY PLANS EXTENSIVE OPERATIONS IN THIS FIELD

The recently organized Southern Utah Oil Company, it is now evident, is a much more pretentious organization than at first seemed to be indicated. The full significance of the company's plans and the broad scope of its intended operations were not given to the public until a week or so ago, when the Denver papers secured release of detailed information the accuracy of which has since been acknowledged by President George T. Hansen, of this city. The company has been quietly financed by Denver, Salt Lake and San Francisco interests. These interests, in addition to Mr. Hansen as president and general manager, includes Governor Frank Franz of Denver, who opened up the now famous Cat Creek field of Montana; F. B. Weeks of Salt Lake, formerly assistant director United States geological survey; Max Ball, president of the Ute Petroleum company, and formerly general manager Matador Petroleum company (Royal Dutch Shell). In charge of field operations, John L. Dougan, of Okmulgee, Okla., experienced operator in Wyoming, Texas and Oklahoma fields.

The company has acquired a large block of acreage on the Duchesne structure, Utah, has moved to the drilling site from Helper, Utah, a complete standard drilling outfit, and is rushing preparations with a view to commencing drilling as quickly as possible. Geological reports by the Dutch Shell geologists, who mapped out this area very carefully, show that approximately ten sands of varying thickness should be encountered within 3000 feet of the surface, and most of these sands show prolific oil saturation where encountered at their outcrops. The site of the Utah Southern's No. 1 well is about six miles southwest of the town of Duchesne and approximately 125 miles from Salt Lake City.

The balance of the acreage on the Duchesne structure is controlled by the Matador Petroleum company (Royal Dutch Shell), Carter Oil company (Standard), Kinney Oil company, Ute Petroleum company, Plata Oil corporation and the Shell Company of California (Royal Dutch Shell).

In addition, the Utah Southern Oil Company controls acreage on the Woodside structure, which was originally mapped out and passed on by the Royal Dutch Shell geologists; on the San Rafael swell, within two miles of the well now being drilled by the Carter Oil Company (Standard); on the Circle Cliffs structure, now being tested by the Ohio Oil Company. In Colorado, the company controls acreage in the Dove Creek and Dolores structures, and is now negotiating for a tract on the McElmo anticline—close to the well now drilling by the Midwest, which has had several good showings of oil. This section of Colorado is the scene of considerable activity at the present time.

The company is also considering the purchase of a producing oil property in Salt Creek, Wyo., and one in the Cat Creek field, Montana. In addition, plans are being examined with a possible view to the building of a refinery at Salt Lake City, to operate on crude from Wyoming fields. The company's headquarters are in Salt Lake City.

Around the State

Stockholders of the Prince Consolidated Mining & Smelting Company met in annual session on the 7th and elected the following board of directors: A. H. Godbe, M. C. Godbe, George F. Wasson, Arthur Thomas and Fred Dern. At this meeting a total of 1,150,000 shares out of 1,440,000 shares outstanding was represented. Those differences which had existed between two factions of stockholders were adjusted and the meeting was held in entire harmony, it is said.

On the first of October the Water Lily shaft of the Chief Consolidated Mining Company, being sunk under contract by the Walter Fitch, Jr. Company, had reached a depth of 1143 feet. For the month of September the contractor reported a total of 406 feet and for the thirty-one days ending on October 1st the total footage was 416 feet. It is thought the new shaft will reach its objective—the water level—by the end of the present month and immediately following a campaign of drifting will be taken up.

The ore showings at the New Quincy are not as encouraging as they were a week ago, yet the management is as optimistic as ever, and present indications justify that optimism. Reports from one who knows say that the ore being followed is identical with the Daly West ore and because of the close proximity of both properties, it is not unlikely the continuation of the Daly West ore body that made that mine famous may yet be encountered, and then; well, you all know what happened to the stock.—Park Record.

The development of the North Beck property, at a depth of 1600 feet, is going forward in a very satisfactory manner according to the manager, E. J. Raddatz, who also says that the showing is more encouraging than it has been at any time since he took up work on this ground. Mr. Raddatz has a lot of faith in the North Beck and feels that he will be able to develop a mine there, with a very good chance of opening commercial ore on the 1600 level where he is now centering his development work.

At the Silver King Coalition the other day, according to the Park Record, General Manager M. J. Dailey was making the rounds of the surface workings and noticed one of the workman taking things exceedingly easy, and feeling assured the man who was "killing time" did not know him, the manager just "loafed" a bit himself to see how much of the company's time this particular workman would consume at one "loafing." At least twenty-five minutes elapsed before the "gentleman of leisure" gave a yawn, laboriously stretched himself, and resumed the pretense to earn his wage. It was then the manager became active, and so severe was the calling down that a sigh of relief was given by the "shirker" when he found himself "walking down the canyon."

In a decision handed down on the 6th instant on objections to the accounting of ore extracted by the Utah Consolidated Mining Company from the property of the Utah Apex Mining Company, Judge Tillman D. Johnson of the United States district court instructed the parties to follow the rules laid down by the court and to make an accounting upon which the plaintiff and defendant can agree. When such an accounting is submitted, judgment will be rendered accordingly, the decision reads. The Utah Consolidated conceded that it had extracted \$500,000 worth of ore from the property in question, following the trial of the case in which a decision in favor of the plaintiff was rendered. Later, the plaintiff filed objections, contending

that the total value of the ore exceeded \$1,000,000. The court, in the decision rendered, holds that the plaintiff will not suffer a substantial loss "if the accounting is made with respect to tonnage and values, as stated by the defendant in its accounting." The rules the court said, are sufficiently explicit to permit a statement of an accounting upon which the parties will be agreed.

Construction Notes

Bids will be received at the City Engineer's office, Salt Lake, up to 10 a. m. on the 19th, for the construction of pipe sewers from Sixth South to Second North streets and thence west to the Jordan river; according to plans in the engineer's office.

It is reported that a mill will be constructed on the property of the Stargo Mines, Inc., near Morenci, following the arrangement to finance the construction work and further development of the mine, recently made with F. O. Longcor, of Newark, N. J. It is expected that work on the mill will be started within sixty days, preparation of the plans for the structure being in the hands of the General Engineering Company, Salt Lake City.

Application for permission to store 6,000 acre-feet of the flood waters of Huntington creek, in Emery county, Utah, to be used in irrigating as many acres of land, was filed with the state engineer recently by Louis Blattler, F. M. Lyman, Jr., E. T. Howard, Martin Jensen and Edward Engle, giving the address of 26½ South Main street, Salt Lake City. A dam 100 feet high and with a concrete core wall ten feet thick at the bottom and a foot thick and 517 feet long at the top, is proposed to create the reservoir, which is to be located far up the creek in the mountains. The land to be irrigated is in the neighborhood of Castle Dale.

Trade Notes

The American Steel & Wire Co. has recently appointed E. E. Aldous as representative in the St. Paul-Minneapolis-Duluth territory. Mr. Aldous has been connected with the company in various capacities for twenty years.

The Hercules Powder Co. announces in this issue that it is resuming operations at its Naval Stores plant, at Brunswick, Georgia, on part time, so that a shortage of Yargan pine oil may be averted.

Arthur Purdon, western field representative of the Crocker-Wheeler electric motor manufacturers, who has been making headquarters in Salt Lake, has moved his offices to 87 New Montgomery St., San Francisco.

The Mine & Smelter Supply Co. has opened Pacific coast offices at 236 Mills Building, San Francisco, with Malcolm H. Carpenter as manager and F. L. Morton assistant manager. Both Mr. Carpenter and Mr. Morton are well and favorably known in Salt Lake City, where each have resided from time to time in years past.

The Bogue Supply Co., of Salt Lake, has recently sold and shipped to the Walton Mines Co., of Spokane, operating north of Fairfield, Idaho, two No. 6 Wilfley concentrating tables. Their installation completes the company's new mill equipment, following which a carload of concentrates a week will be coming to Salt Lake smelters.

In Nearby States

ARIZONA

The gross gold production of the United Eastern for July was \$157,039.00. This brings the total gross production of the Bonanza gold mine up to \$9,619,739.00.

The Verde Venture Mining Company, of Prescott, was recently incorporated with a capital stock of \$3,000,000, divided into a like number of shares of the par value of \$1 each. Incorporators of the company are Richard Lamson, Alex. L. Jones and Marion B. Jones, all of Prescott, Arizona.

Assessment work on the Copper Mountain group, just finished, resulted in added good showing of copper ore, according to M. E. Gibson, who, with W. A. Knox, owns the property, which is situated about 14 miles southeast of Ajo. A new shaft was put down to a depth of 40 feet, all in ore carrying values running from 2 to 22 per cent.

A 150-ton mill has been completed on the property of the old Hedges mine, in the vicinity of Ogilby, Yuma county, now being operated by M. O. Goodner, it is reported. A power plant has been installed to operate the mill which will be used to work the tailings on the dump of the old mill. It is estimated that the dump will net around \$3 in gold per ton and a small amount of silver.

COLORADO

Some remarkably fine specimens of free gold ore have been exhibited from a new discovery on Bard Creek. A number of Denver men visited the property recently with a view of buying it.

The old Pennsylvania property, a former heavy shipper of crude lead-silver ore, is now keeping its mill steadily at work on concentrating ore, says the Breckenridge Journal. A four-ton truck and several four-horse teams are busy hauling the concentrates and ore to the railroad at Keystone for shipment.

Fairplay has come back, says the Salida Mail. A company has started to dredge the hills near town and will have one big dredge in operation this year and four more next year. Fairplay dirt is real pay stuff and there is so much of it that even with four dredges going the company does not think it can touch more than a small fraction of the rich territory in the next ten years.

IDAHO

The Columbus Mining Company has received a new compressor, which will be installed on its property on Eagle creek at once.

George Saad reports that the shaft of the gold mine on his farm, near Troy, has been sunk to a depth of 24 feet and the ore is of an even better grade than that found at the beginning of the work.

According to reports a second furnace is to be blown in at the Bunker Hill & Sullivan smelter in the near future. The increase in capacity is made possible by a recent accumulation of ore from mines of the Coeur d'Alene

region and the favorable freight rates from British Columbia points recently established.

Four men are employed by the West Hunter Mining Company, on Mill Creek, near Mullan. They are engaged in drifting east from the crosscut run from the main tunnel of the American-Commander. The drift is now reported to be about 200 feet in length, the purpose being to get under a promising showing disclosed in a shaft near the top of the hill.

Lessees operating on the property of the Western Union Mining Company, near Wallace, shipped ore having a gross value of \$54,445 between November 19, 1920 and August 18, 1921, according to recent reports. The net smelter returns were \$35,725 and the royalty \$8,932. These returns encouraged the company to continue the leasing system. Four sets of lessees are now at work.

It is reported that the Caribou Mining in Bonneville county, has encountered a ledge of high grade ore, 16 in. wide, in tunnel No. 3 of the Caribou mine. No assay has been made, but mining men estimate that it will average 70 per cent lead and between 20 and 25 ounces of silver to the ton. Work on the lower tunnel is progressing fast. It is estimated that 40 feet of cross-cutting will be necessary to strike the main ledge.

An option on the stock of the Hill Mining Company, Slaughter House gulch, in the Coeur d'Alenes, and the property of which adjoins the East Caledonia on the east, has been secured by Patrick Brady and W. J. Stratton. A vein four feet wide, containing 4 per cent lead and six ounces of silver to the ton, has been intersected by a cross-cut at a depth of 2,000 feet, driven by predecessors, was reported recently.

The Ajax Mining Company expects to drive a tunnel on new ground near Burke in the near future, according to A. C. Bixby, manager. A wagon road will be built to the site, the ground will be leveled for new buildings and the compressor and other machinery will be removed from the Moonlight tunnel. The work is well advanced. The tunnel to be driven will attain an additional depth of 500 feet below the workings in which ore was disclosed.

J. W. Buchler, manager of the Silver Reef Mining Company, of the Coeur d'Alenes, reports that the company will soon commence a program of development through the lower tunnel of the Homestake mine. The Silver Reef has secured an easement to use this tunnel. By extending the tunnel about 900 feet an additional depth of 1,100 feet will be secured, giving a total depth of 1,700 feet below the surface. In the lower tunnel of the Silver Reef Mr. Buchler reports an ore shoot 887 feet long, sometimes 12 feet wide, with high grade ore on one wall.

Directors of the Sunshine Mining Company were elected at the annual meeting of stockholders at Wallace recently. The company has holdings on Beaver creek in the Coeur d'Alenes. President Dan McGrath expressed confidence that during the coming year the company will resume operations on an extensive scale. Directors are: Dan McGrath, president; John Lucas, vice president; H. J. Hull, secretary-treasurer; Eugene R. Day and A. L. Horneker, all of Wallace, and David C. Smith and Dr. E. G. Ellis, both of Missoula, Montana.

That the Bunker Hill & Sullivan Mining & Concentrating Company intends to engage in a comprehensive investigation of mineral possibilities in the Wood River country of Idaho is evidenced by the taking of bonds on three properties and its negotiation for another. The properties involved are credited with yields of many million of

dollars in high grade lead and silver ore to pioneer operators without having been penetrated to great depth and it is believed they can be made responsive on a large scale when the Wood River fault problem is solved. It appears that a study of the problem is a purpose in the bonding of the properties by the Bunker Hill.

MONTANA

A five-year lease on the property of the Consolidated Silver-Lead Mining Company, located seven miles from Troy, has been taken by J. P. Schmuck and C. J. Cavenaugh, Spokane men. The new holders are now driving a tunnel 300 feet directly on the ore body, which is expected to open up a large body of shipping ore.

NEVADA

Announcement has been made by the Nevada Consolidated Copper Company that it will ship 10,000 tons of copper which has been stacked up at the Steptoe plant for many months past.

L. L. Sowers, who has charge of building operations at the new chemical plant at Winnemucca, has started the foundation for the laboratory building. This structure is to be 30x64 feet and will be located on the west side of the main building, which is nearly completed.

The property owned by Flynn and Trembath in the old camp of Tuscarora, on which an exceptionally rich strike of gold ore was made a short time ago, has been procured by a group of Winnemucca people, says the Star, composed of Erling Prout, Lee Case, Vernon Bell, Tiffany Poulin, Oscar Reinhart and Erman Ruckteschler.

Ore fairly bristling with small nuggets and particles of gold is the latest find on the property owned by Silvers and Stolfelt at the camp of Ten Mile, says the Winnemucca Star. The ore is heavy in gold and is the richest yet found in that property. Regular development work is in progress on the estate and as depth is attained the vein is showing stronger and pans well in gold.

A steam shovel, a carload of lumber, a carload of pipe and one of cement are among the materials that have arrived for use in a placer mining project 50 miles south of Goldfield. The ground is at Log Springs and the owners, three Goldfield men, have optioned it to Los Angeles operators who have built a dam and are planning extensive work.

A miner at Contact, in Elko county, is in hard luck. In prospecting ground near the camp he found a rich gold vein, opened a promising ore-shoot and proceeded to locate the ground. At the office of the county recorder he was informed that the ground had been patented and was owned by the Utah Construction Co. The miner and his partners are said to have expended a considerable amount of money in developing this ground.

The plant of the Lake Valley Mining Company, with a capacity of 50 tons daily is now nearing completion and will soon be in operation. The plant is located near the company's mines, only a few miles distant from the Geyser ranch in the northern portion of Lincoln county, about sixty miles south of Ely. The company has been developing its mines for a number of years and has a large tonnage of good milling ore ready for treatment. It has also shipped a considerable tonnage of high grade ore during the past few years which gave most satisfactory returns.

WASHINGTON

D. J. Parker, chief of the division of mine rescue cars and stations was a Spokane visitor recently.

"The Addison Copper Company, having a property three and one half miles north and a mile east of Keller, Ferry county, has resumed operations," said C. A. Gray, manager, in Spokane recently. "The Federal shaft, down 37 feet, will be extended 200 feet. The ore contains \$76 to the ton, of which \$15 is in silver, at the 37-foot point. We are entering sulphide and expect an improvement in values as depth is attained. The vein is four and a half feet wide between well defined walls."

The Ololim Copper Company, on the former Spokane Indian reservation near Detillion Bridge, is repairing and rebuilding a road that lies near their mine on its course from the old Deer Trail, Queen, Seal, and Germania Mines in the Deer trail mountains, to the Spokane river above River Homes. The Ololim Copper Company proposes to complete this road and provide a ferry or bridge the Spokane river to the North Star road to Davenport, where there is a surfaced road for heavy hauling from the river to Davenport, according to reports received at Spokane. The completion of the North Star highway next year promises the opening of the Deer Trail and Spokane Reservation mines in the spring. It is believed the state may take up the project of building a bridge at the Laughlon crossing in the near future.

Petroleum Notes

The Ute Petroleum has most of its outfit at the site of its proposed well near Duchesne and will soon be ready to begin operations. It is going to be prepared to meet most any situation before it starts drilling.

The Laramie-Red Desert Oil and Gas Co., drilling in section 18-26-77, north of Laramie, Wyoming, has shut down for the winter at 4,780 feet, and placed a watchman in charge of the plant.

Operations have been stopped for the winter months by Fargo Oil Co. in the Poison Spider district, Wyoming. This corporation has eight gas wells with an open flow of 55,000,000 cubic feet, of which 10,000,000 are being sold daily.

The Utah Oil Refining at Farnham, Utah, got its reaming job completed easily and is going on down without further difficulty. Everything is in satisfactory shape with nothing to be said except that the whole crew is working right along.

Cuts of from \$8 to \$10 a ton in various grades of pipe, and ranging as high as \$14 a ton on special grades, have been announced by the National Tube Co., a subsidiary of the U. S. Steel Corporation. The reductions affect oil country steam, gas and water pipe. This is the first official price reduction on pipe since July 7, 1921.

Sheriff D. C. Oakey sold at public auction at Sage on the 3rd instant the entire outfit of machinery and equipment of the Bear River Oil & Development company to satisfy a judgment held by Julian Brothers, merchants of Sage, amounting to about \$1300. The outfit consists of a derrick, erected at the well site, and a complete lot of drilling equipment and camp furniture and fixtures.

The Western Petroleum Exploration Co. has blocked up considerable acreage on the Crown Butte structure in

Cascade county, Montana, and is preparing to put down a test on the $\text{se}\frac{1}{4}$ of sec. 35-20-2w. Leases on 3,579 acres have been placed on record. The test will start in the Colorado shale and all of the probable producing sands will be reached within 2,500 feet according to geologist's estimates.

The Midwest Refining company, one of the two principal purchasers of crude oil in Wyoming, early in the month, posted an increase of 25 cents a barrel in eight grades. The new prices follow: Grass Creek, Elk Basin, Torchlight and Grey Bull, \$1.25; Lance Creek, 90 cents; Salt Creek and Big Muddy, 75 cents; Mule Creek, 70 cents. The increase also is effective in Cat Creek, Montana, crude. The increase posted is the first jump in Wyoming crude oil since the decline which started last year.

M. J. Greenwood, sales manager of the Utah Oil Refining Co., subsidiary of the Midwest Refining Co., is quoted in Wyoming as saying that the plant at Salt Lake City is now operating at capacity and turning out 35 carloads of products daily. These include gasoline, kerosene, oils, lubricants and waxes. The wax is exported to Japan at the rate of 200 tons per month, where it is used for making matches and candles. The plant has 500 employes and operates principally on Wyoming crude.

Coal Notes

Most of the Spring Canyon properties are working six days a week.

W. L. Lamph has resigned as chief clerk up at Cameron to go with a Zion real estate firm.

The Western expects to be working a large force of miners up on Gordon Creek during October.

Lump is being advertised by retailers at Salt Lake City at \$7.85 delivered. Nut \$7.50 and pea \$5.00.

United States Fuel Company mines in Carbon and Emery county are getting in two and three days a week.

J. W. Jewkes has resigned from his clerkship with the store company at Standardville to go with Liberty Mercantile company at Latuda.

Output in the Carbon fields is rapidly approaching normal. It is predicted that by another month all properties will be going full-time.

Steamshovel work on the grade of the Mutual Coal Company to its No. 2 mine in Spring Canyon is completed. Fifteen dwellings for employes are now well under way.

Emery county's board of education is advertising for about a thousand tons of lump delivered by wagon haul at some ten to fifteen places. It will cost on an average about \$5.50 the ton.

Reports received by the United States Bureau of Mines from the various state mine inspectors show that 141 men were killed in and about the coal mines of the country in the month of August as compared with 203 killed in the corresponding month in 1920. The figures indicate a decrease of approximately 31 per cent from the fatality record of August of last year. Based upon an estimated output of 42,191,000 short tons in August, 1921, the fatality rate for August is 3.34 per million tons produced. The corresponding rate last year was 3.57 and the production of coal was 56,935,000 tons. The production of coal during August, 1921, represents a decrease of 26 per cent.

Personal Mention

Walter Fitch, president of the Chief Consolidated Mining Co., left for the East a few days ago on a brief business trip.

George D. Blood, manager of the Park-Utah properties at Park City, accompanied by Mrs. Blood, left for the coast early in the week.

Albert Roberts, field representative of the Minerals Separation North American Corporation is making his headquarters in Salt Lake for a short time.

S. F. Hunt, who is operating the Jackson mine, in Elko county, Nevada, under lease and bond, left for the property a few days ago to get things in shape for production when the lead market becomes favorable.

Henry Newell, a director in the Silver King Coalition Co., and for many years a prominent resident of Park City, and who now makes his home at Ocean Park, California, is in Salt Lake for a short stay.

J. G. Phelps Stokes, president of the Nevada Central Railroad Co., and J. W. McCulloch, a director, have been at Austin, Nevada, attending a meeting of the company. The Stokes interests used to be well known in Salt Lake when they were operating extensively in the mines at Austin.

R. E. Palmer, consulting engineer of the Rio Tinto Company, Ltd. of Spain, was a recent visitor at the mines and plant of the Utah Copper Company. The visitor was especially interested in the steam-shovel methods of mining employed at the Utah Copper's Bingham mines. Mr. Palmer went from here to Montreal, Canada.

William Wraith, general manager of the International Smelting Co., with headquarters in New York, announced, during his recent visit to Utah, that O. M. Kuchs, assistant general manager of the Utah plant, had been made general manager of the Andes Copper Mining Co., with headquarters at Potrerillos, Chile. Succeeding Mr. Kuchs as assistant general manager of the International plant, at Tooele, with headquarters in Salt Lake, is J. O. Elton, who resigns the assistant managership of the Great Falls, Montana, smelter of the Anaconda Copper Mines Co. Mr. Elton has already arrived and takes up his new duties at once.

Walter E. Gaby, a native Salt Lake boy, who graduated from the University of Utah several years ago as a mining geologist, and who later took a post-graduate course in geology at Columbia, is now making a name for himself in Mexico. As mining geologist for the Santa Gertrudis Mining Co., Ltd., and the Mexican Corporation, a subsidiary company, recently opened a promising body of high grade copper-zinc ore on property near Teziutlan, Puebla, Mexico, leased by the latter corporation from the old Teziutlan Copper Co. Mr. Gaby also is directing development work on the Santo Tomas and El Bordo mines of the Santa Gertrudis Co., at Pachuca, in the state of Hidalgo. His old Salt Lake friends will be glad to hear that he is making good in his chosen profession.

A Scotchman who was notorious as a skeptic had erected a massive mausoleum for his final rest and one day he observed an elder of the kirk gazing at it. "Strong place that, hey David?" he said. "It'll tak a mon some time tae raise up oot o' that at the Day o' Judgment." "Hoot, mon," said David, "ye can gie yersel little fash aboot raisin' when that day comes. They'll tak the bottom oot o' it and let you fa' doon."

NATURAL GAS-GASOLINE BLENDS

By D. B. Dow*

Natural gas-gasoline is made by collecting in the liquid state the condensable hydrocarbon vapors that exist in different natural gases in varying amounts. In the richer type of natural gas the gasoline is generally recovered by compression and cooling. If exceedingly high pressure or low temperature is used, there is dissolved in the gasoline a large amount of very volatile material, which evaporates rapidly at atmospheric temperature and pressure.

In the leaner type of natural gas, the gasoline vapors are selectively absorbed from the permanent gases by passing the natural gas through an absorbing oil. The gasoline is recovered by distilling the saturated oil, and as compared with "compression" gasoline is of high Baume gravity and low vapor pressure. Before a volatile gasoline can be transported in tank cars, it is necessary to decrease its volatility in order to lessen the risk of fire or explosion, as well as to prevent excessive evaporation in transit. This can be accomplished either by weathering the gasoline, or by blending it with a more stable material, naphtha being commonly used. In the weathering process the more volatile portions of the gasoline are allowed to evaporate and the losses in volume are very large. Therefore, blending is preferable, wherever possible.

It is very difficult, however, to produce by blending, in gasoline plants, a motor fuel which is equal to straight-run refinery gasoline. In order to make a blended motor fuel of a grade equal to straight-run gasoline, only a small percentage of natural gas-gasoline can be blended with the naphtha, consequently it is customary to blend the gasoline with only enough naphtha to enable it to be shipped to an oil refinery when the material is again blended to form a finished motor fuel.

The addition of natural gas-gasoline to straight-run products is often necessary, first, to balance the large amount of high-boiling material included in the gasoline fraction in modern refineries, and second, to supply the deficiency of low-boiling material in certain crudes.

In the past, blends were frequently made with kerosene and were subsequently distilled, the kerosene merely acting as a carrying agent for the natural gas-gasoline. However, this re-running was found to be rather expensive on account of distillation losses due to the volatility of the natural gas-gasoline. This particular type of blend was also tried as a motor fuel, but proved to be very unsatisfactory.

The most common blending material now used in the Mid-continent field is a naphtha ranging in gravity from 50 to 52° B., with an end point of 450° F. or less. When this naphtha is blended with natural gas-gasoline, the vapor pressure and Baume gravity of the blend is much lower than in the raw gasoline, and there is not enough high-boiling material to injure the resultant motor fuel when this blend is added in small amounts to straight-run gasoline.

It is not necessary to use 50-52° naphtha for blending with natural gas-gasoline, as there are other comparatively volatile petroleum distillates that will accomplish the same purpose. It is quite possible to use straight-run gasoline of 56-58° B. gravity as a blending material, when the object of blending is that of bringing down the vapor pressure to conform with shipping regulations. It has been found that blends made with either 50° B. naphtha or 56° B. gasoline, blended in the same proportion with natural gas-gasoline, will give almost identical vapor pressures. This possibility can be made use of to advantage when 50° B. naphtha commands a high-

er price than 56° B. gasoline, or when naphtha is temporarily unobtainable. The Bureau of Mines has found that by re-running kerosene in the Bartlesville experimental refinery, 20% of 46° B. naphtha with an end point of 450° F. could be obtained.

The present price of kerosene is so low that many refiners are mixing the unfinished material with fuel oil and gas oil instead of refining it. An opportunity, therefore, exists for the re-running of kerosene distillate and obtaining a naphtha with an end point of 450° F. It should be pointed out, however, that to get yields comparable to those obtained by the Bureau, efficient fractionating towers must be used.

The naphtha produced in this way is an excellent blending material and will reduce the vapor pressure of the gasoline to the same extent as 50° B. naphtha. It would not, however, produce a blend which is suitable for motor fuel when used alone, as the mixture would contain an excess of both low-boiling and high boiling fractions and would be deficient in the hydrocarbons that have medium boiling points. This blend can, however, be advantageously added to straight-run gasoline, since the natural gas-gasoline contained in it will furnish the required low-boiling material.

BRITISH COLUMBIA MINE REPORT

The Standard Silver-Lead Mining Company shows a surplus of \$336,275 in its report for the quarter ended on June 30, last, only recently issued.

The receipts on operating account were \$6,709, of which \$1,370 was from the sale of zinc ore, \$4,205 from the sale of lead ore, \$359 from the sale of supplies and equipment and \$775 from the sale of store supplies.

The disbursements were \$8,162, of which \$3,877 was for labor and \$5,286 for supplies. The relative operating loss was \$9,454. The home office account shows the receipt of \$4,243 and the disbursements of \$1,912, leaving a profit of \$2,320 on this account and a net loss of \$223 on all accounts for the quarter. The \$4,143 in home office receipts was in the form of interest received. The \$1,913 expended on home office accounts includes \$10 for legal expense, \$1,221 for general expense and \$682 for exploration.

The report shows that the company has \$310,346 in bank, cash and government bonds, \$38,000 in farm mortgages and \$20,000 in bills receivable, a total of \$368,346 from which there is deductible \$1,297 for pay roll and \$774 for bills payable.

The property of the company was sold under a bond and lease early in the summer, but no money is possible from this source for a considerable period under the terms of the bond. The operations are being directed by Clarence Cunningham.

EMPIRE COPPER REORGANIZED

A Pocatello, Idaho, dispatch of the 10th says: The Empire Copper company of Idaho has been reorganized under the title of the Idaho Metals Company with a capitalization of \$1,200,000. Most of the holdings of the company, which are near Mackay, consist chiefly of copper mines and prospects.

The new officers of the reorganized company are L. R. Eccles, president; Ralph E. Bristow, vice president; P. B. Porter, director; C. A. Boyd, director; H. V. Jenkins, director, and H. D. Campbell, secretary-treasurer. The company hopes to find it practical to resume operations before the first of November. The company will operate chiefly under the leasing system.

*Assistant petroleum chemist, Bureau of Mines.

NEW BORATE FIELD IN NEVADA

Deposits of colemanite, a mineral that yields borax, which were recently discovered in southern Nevada, have been examined by L. F. Noble, a geologist of the United States Geological Survey, Department of the Interior, who reports that colemanite occurs in two areas in the Muddy Mountains. One area, known as the White Basin district, lies just east of Muddy Peak, about 15 miles southwest of St. Thomas. Mr. Noble says that the colemanite here occurs in irregular layers interbedded with whitish shale, most of which appears to be composed of very fine, more or less calcareous volcanic ash. In places the shale contains considerable gypsum and thinbedded limestone, and here and there beds of tuff, some of which is light and pumiceous. Much of the limestone shows concretionary structure and weathers into globular form resembling goose eggs, which scale in concentric layers like an onion. These so-called "goose eggs" are of much value to the prospector in locating the horizon of the deposit. Mr. Noble concludes that the deposits of colemanite, some of which contain material whose structure suggests that of ulexite, or "cottonball," were originally formed as ulexite in mud just as ulexite is being formed in the dry lakes or playas of desert basins today, and that percolating waters highly charged with lime may have afterward changed the ulexite to colemanite.

The structure of the goose-egg limestone suggests spring deposits built up layer upon layer by evaporating waters highly charged with lime. Volcanic activity in this general region, which is proved by the presence of volcanic ash in many beds, suggests the ultimate source of the boron that formed the ulexite, and the great masses of Paleozoic limestone in the Muddy Mountain Range were doubtless the source of the lime.

The formation that contains the colemanite is known as the Horse Spring formation. This series of beds and the underlying Overton conglomerate are of fresh-water origin and are probably of Miocene age. They rest unconformably on older rocks but have been bent and somewhat faulted by folding.

In the White Basin district the layers of colemanite as exposed range in width from a fraction of an inch to a maximum of 2½ feet, and though the district as a whole is considerably faulted there seems no reason to doubt that it contains a large quantity of commercially valuable material. A carload of colemanite has been taken out by the American Borax Co. for shipment from St. Thomas.

The area that contains the largest deposit in the region is known as the Callville district. This deposit was found last December by Lovell & Hartman in the canyon of one of the tributaries of Callville Wash., about 12 miles southwest of White Basin and 6 miles south of Muddy Peak. The bed of colemanite, which forms a part of the Horse Spring formation, has a minimum thickness of 10 feet and a maximum thickness of 18 feet, and its outcrop is visible for at least 3,000 feet along the rim of an eastward-trending canoe-shaped syncline, the east end of which has been made irregular by faulting. The colemanite is interbedded with shales, which lie near the top of a thick series of massive limestones. The horizon of this huge colemanite deposit can be traced all around the inner rim of the syncline for several miles along the outcrop, though colemanite is not visible in considerable amount except in the great lens already mentioned.

The colemanite appears to occur at the same horizon in the Horse Spring formation, both at White Basin and near Callville, Wash.

The great deposit near Callville Wash., consists es-

entially of solid layers of colemanite alternating with layers of paper shale or limestone. The bedding in some parts of the shale is wavy and within the "vein" exhibits the typical goose-egg structure, but in others it is regular and parallel. A large part of the deposit consists of massive crystalline colemanite, which, however, is interbedded with shaly material and will probably have to be concentrated. So far as can be judged from the two open cuts already made across it, the deposit or "vein" as a whole may be expected to run at least 30 per cent of pure colemanite and may run as high as 50 per cent.

ACCIDENTS AT COPPER MINES DURING 1920

Reports received by the United States Bureau of Mines from companies operating copper mines throughout the country show that accidents during the year 1920 resulted in 128 deaths and 12,042 injuries, a decrease of 12 fatal and 194 nonfatal accidents as compared with the preceding year. The copper mining industry employed 35,254 men, who worked 11,182,119 shifts, which is a decrease of 4,073 men and 674,372 shifts as compared with 1919. Each mine employee averaged 317 working days, as against 301 the year before. The figures indicate a fatality rate of 3.43 (3.54 in 1919) and an injury rate of 323.07 (309.60 in 1919) per thousand men employed, based upon a standard year of 300 working days.

A decrease in the number of shifts worked underground is shown for the states of Montana, Michigan, California, Nevada, and Idaho, while an increase is noted for Arizona, New Mexico, Utah, Washington, and Alaska. Open-pit operations showed increased shifts worked in Arizona and Nevada, while there was a decrease in the states of New Mexico and Utah.

Of the total number of shifts worked at copper mines during the past year 66 per cent were underground, as compared with 69 per cent in 1919, and 71 per cent in 1918. Shifts worked at open-pit mines in 1920 constituted 8.5 per cent of the total, as against 7.3 per cent in 1919, and 7.0 per cent in 1918.

Of the 128 fatal accidents during the year, 90 occurred underground, 17 in shafts, 15 at open-pit workings, and 6 in surface shops and yards. At copper mines in Arizona, 45 men were killed, 33 in Montana, 22 in Michigan, and 5 each in California and New Mexico. Underground employees numbered 23,671, those in open-pit mines 2,766, and employees in shops and yards above ground, 8,817.

Of the total of 12,042 nonfatal accidents, 9,386 were underground, 235 in shafts, 951 in stripping operations, and 1,470 in yards and shops. In the number of persons injured, Arizona led the list with 6,199, followed by Michigan with 2,017, Montana 1,937, Utah 521, New Mexico 485, and Nevada 224.

The principal causes of nonfatal accidents underground were: 2,449 by falls of rock from roof or wall, 1,243 while leading at working face, 1,221 haulage, 1,031 timber or hand tools, 597 drilling, 273 persons falling down chute, winze, raise, or stope, 230 nails or splinters, 173 run of ore from chute or pocket, 135 explosives, and 72 machinery. In shaft accidents, 50 persons were injured by cages, skips, or buckets, 49 by objects falling down shafts, and 18 by persons falling down shafts. Of the injuries at open-pit mines, 127 were caused by hand tools, 83 by falls or slides of rock, 72 by steam shovels, 70 by haulage equipment, 66 by falls of persons, 38 by machinery, and 24 by explosives. Of those injured at surface shops and yards, 160 were hurt by hand tools, axes, bars, etc., 141 by falls of persons, 112 by machinery, 69 by mine cars or aerial trams, 69 by nails and

splinters, 31 by run or fall of ore in or from ore bins, and 19 by railway cars.

Of the principal causes of underground accidents at copper mines, the most notable reduction was in those due to falls of rock from roof or wall, while at open-pit mines the principal decreases were in accidents caused by haulage and by falls or slides of rock or ore. An increase occurred in accidents underground caused by drilling and by nails and splinters, while at open-pits slight increases occurred in accidents from machinery and hand tools.

MINE OPERATORS INSTITUTE PERMANENT

The Utah Mine Operators Institute, which concluded a two-day session on Saturday last is to be a permanent fixture of the mining industry of the state.

Confirming the views of a number of speakers that the convention had proved of immense benefit to those who had attended as a result of the exchange of ideas and discussions of matters of importance to the mining industry, those present at the concluding session voted unanimously to hold annual mine institutes.

Hereafter, however, the institutes will be held in various mining camps in consecutive order instead of the capitol city, as the consensus of opinion was that it would be better to get together where the mines are in actual operation.

An executive committee of eleven will be selected to arrange plans for the next institute and to select the place for holding the meeting next year.

OLD MINE IN NEW MEXICO COMES BACK

Las Cruces, N. M., Oct. 12.—Volcano Mines Co. has been incorporated under the laws of New Mexico with an authorized capital stock of \$2,000,000. The incorporators and officers are: C. W. Mitchell, president and general manager; C. Royall, vice president; Jackson Agee, treasurer; T. C. McSherry, secretary; all of Silver City.

The Volcano group, including the Volcano mine, is located near Steins, Grant county, N. M., which recently was the scene of the strike of the year in the Southwest, when the second shot in a vein exposed from 12 to 14 feet of rich ore. The mine which has a recorded production of more than \$300,000 in silver, has been idle 20 years.

Hudson A. Millard, banker and mining engineer of New York City who visited the mine soon after the strike was made, will finance the further development and operation of the property. Mr. Mitchell is in New York to make final plans for operating the mine on an extensive scale. Three hundred tons of ore shipped from the mine recently show an average value of \$40 a ton. Ore bodies amounting to 150,000 tons have been developed on the property.

FACTS ABOUT ASBESTOS

The art of weaving the mineral fiber in asbestos, which is ordinarily indestructible, was rediscovered at a comparatively late period of civilization. Woven asbestos was used in the ancient pyre to preserve the royal ashes. Charlemagne is said to have had a tablecloth made of asbestos and to have cleaned it by throwing it into the fire, which consumed the dirt, thus illustrating in a spectacular manner one of the most valuable properties of this material.

The fiber of the best grade of asbestos is beautiful and silky and has great flexibility, elasticity, and tensile strength, according to the United States Geological Survey. It can be spun into thread so fine as to run 225 yards to the ounce,

and as it is incombustible as well as a nonconductor of heat and electricity and resists the action of most ordinary acids; its field of use is large. The possible applications of asbestos are far from fully appreciated not only by the general public but by manufacturers who are in search of material for special uses to which asbestos may well be applied. Perhaps it is most generally used to make fireproof cloth for theater curtains. It has been used also for making firemen's clothing. Everywhere in cold countries it is extensively employed for covering furnaces, boilers, and pipes to prevent loss of heat. Asbestos is a good insulator.

IDAHO'S MINE INSPECTOR MAKES GOOD MOVE

Stewart Campbell, Idaho's state mine inspector, has added a new feature to the office that will bring it closer to the prospector and general public, and at the same time increase its usefulness by serving a great number who heretofore were not particularly benefited.

As the incentive for prospecting comes from knowing the value and the market for the ore or mineral sought for, or found, and as there is no general source available where the prospector or others can find the marketing place for any of the uncommon ores or minerals, Mr. Campbell has prepared a list of the purchasers and users in the United States of the following metal and non-metal products, all of which are found in the state:

Antimony, barytes, bauxite, (aluminum) bismuth, cadmium, chromium (chrome ore), cobalt, diatomaceous earth, feldspar, fluorspar, Fuller's earth, graphite, gypsum, magnesium, magnesite, manganese, mica, molybdenum, nickel, platinum, pumice, radium, silica sand, sodium, tale, tin, titanium (rutile) tripoli, tungsten, uranium, and vanadium.

The purchasers or users of the particular mineral one is interested in will be furnished on request to his office. With this information and the services of the Idaho bureau of mines and geology, Moscow, available for a qualitative determination on unknown minerals, the state has opened two avenues of assistance leading to the development of her mineral resources.

Mr. Campbell has also equipped the office with a reference library and has more than 2000 volumes, which are available for public use.

MEXICAN METAL PRODUCTION FOR 1920.

The following table, supplied by the financial agent of the Mexican government in New York City, gives the metal production of Mexico in 1920:

Gold	\$ 30,485,678.00
Silver	134,232,712.00
Lead	28,881,159.00
Copper	37,878,149.00
Zinc	5,321,200.00
Mercury	360,562.00
Manganese	1,603,734.00
Graphite	483,441.00
Antimony	230,352.00
Tungsten	111,256.00
Molybdenum	13,620.00
Arsenic	1,338,691.00

Total\$240,940,554.00

Note—To fix the value of the metals, average New York quotations were used.

SALT LAKE MINING STOCK QUOTATIONS

The range of the market from September 26th, 1921 through October 11th, inclusive. Quotations furnished by J. A. Hogle & Co., direct wires to all leading markets, 169 So. Main St., Salt Lake City, Utah, and ground floor of Eccles Building, Ogden, Utah.

Stock.	CLOSING							Stock.	CLOSING						
	Open.	High.	Low.	L. S.	Bid.	Asked.	Sales.		Open.	High.	Low.	L. S.	Bid.	Asked.	Sales.
Alta Mich.								Lehi Tin	.02½	.02½	.02	.02½	.02½	.02½	5,000
Antelope Star								Leonora	.02½	.03	.01½	.02½	.02½	.03	16,000
Alta Con.							1,000	Logger						.01	1,000
Albion Cons.	.03½	.03½	.03½	.03½	.03½	.05½	4,000	Lynn Big Six	.04	.05	.03	.05	.04	.05½	20,420
Am. Metals						.05	1,000	Miller Hill						.02	
Alta Tunnel	.13	.14	.09½	.12	.11	.12½	51,400	May Day	.01	.01	.01	.01	.01	.03	11,000
Bullion	.02½	.02½	.02½	.02½	.02½	.05	1,000	Michigan-Utah	.05	.09½	.05	.07	.06½	.07½	63,824
Big Hill	.02½	.02½	.02	.02	.02	.02½	3,000	New Quincy	.07	.12	.06½	.07½	.07½	.08	228,950
Big Cott. Coal.	.04	.04½	.04	.04½		.05	2,000	Naildriver						.20	
Bingham Gal.	.12	.12	.05	.07½	.07	.07½	135,200	No. Standard	.02½	.03	.02½	.03	.02½	.03½	16,500
Beaver Cop.	.01	.04½		.01	.01	.01½	20,000	Ophongo							
Bay State						.04		Plutus	.15	.15	.15	.15	.14	.19	500
Black Metals	.02½	.02½	.02½	.02½	.03	.04	3,000	Prince Con.	.07	.08½	.06½	.07½	.07½	.08	63,100
Cent. Eureka						.02		Paloma							
Colb. Rexall	.19	.19	.16	.16	.15½	.17	3,300	Pioche Bristol							1,000
Colorado Con.					.02	.03		Price Mng.	.02½	.02½	.02½	.02½	.02½	.03	1,000
Crown Point	.02	.02½	.02	.02½	.02	.03½	5,500	Provo					.01½	.04	
Cardiff	1.05	1.05	1.05	1.05	1.05	1.10	200	Rico Arg.						.02	
Croff								Reeds Pk. Con.						.01½	
Daly	1.10	1.10	1.10	1.10	1.25	1.75	20	Rico Well							
Daly West					1.60	2.50		So. Standard	.15	.15	.15	.15	.12	.15½	2,850
Dragon					.03½			Sells	.02½	.02½	.02½	.02½	.02	.03	4,000
Emma Silver	.01½	.01½				.01	24,600	Syndicate							10,000
Empire Mns.					.02	.01		Sil. King Coal	1.67½	2.00	1.67½	2.00	1.90	2.05	650
Eureka Mns.	.04½	.04½	.04½	.04½	.04	.04½	2,500	Sil. King Con.	.65	.65	.41	.50	.48	.50	9,815
E Crown Point	.02	.02	.02	.02	.02	.02½	6,000	Sioux Cons.						.01	
E Tin Coal		.01					20,000	South Hecla						.11	30
E Tin Con.	.09½	.09½	.09½	.09½	.07	.09½	500	Silver Shield	.06	.06	.04½	.05½	.05	.07	8,000
Eureka Lily	.09½	.09½	.09½	.09½	.08½	.10	7,125	Tar Baby		.03½		.02½	.02½	.02½	61,000
Eureka Bullion	.06½	.06½	.04½	.05	.04½	.05	35,900	Tin. Central	.01½	.01½	.01½	.01½	.01	.01½	5,000
Gold Chain					.03½	.05		Tin. Standard	1.85	2.05	1.80	1.95	1.90	1.92½	33,282
Grand Central					.10			Utah Con.							2,000
Hamburg Mns.						.01		Union Chief	.02	.02½	.02	.02½	.02½	.03	6,500
Howell	.06	.06	.05½	.05½	.05½	.06	8,300	Victor Mng.	.02	.02	.02	.02	.01½	.03	2,000
Iron Blossom	.16½	.16½	.16½	.16½	.12	.20	610	West Toledo	.02	.03½	.02	.03½	.03½	.03½	19,000
Iron King	.08½	.08½	.08	.08	.06½	.07½	3,000	Walker Mining	2.12½	2.50	2.12½	2.50	2.40	2.70	3,400
Judge M. S.					2.00	3.00		Woodlawn	.08	.08	.07	.07	.07	.08	4,000
Keystone						1.00		Yankee Con.	.01½	.01½	.01½	.01½	.01½	.02	3,000
Kennebec					.05	.08		Zuma	.02½	.02½	.02½	.02½	.02½	.03½	8,500

ALTA TUNNEL MARKETS FINE ORE

Forty-three tons of ore, with a gross value of over \$2,000 was marketed by the Alta Tunnel & Transportation Company during the week. This consignment of ore was the first shipped since the recent strike made at the property, and is indicative of what may be expected to follow as development of the property progresses. The ore was sold on contract assays showing 44.7 ounces silver, 23.3 per cent lead, a little gold and a little copper. The raise in which the strike was made a few weeks ago is reported to be up a distance of seventy-five feet and that it is in commercial ore all the way.

The strike, according to reports of those who have been keeping in closest touch with development, is declared to show every evidence of opening up a large and permanent ore body and the company expects to make a fine showing during the winter, as ore can be shipped regularly, storms or no storms.

ASSESSMENTS PENDING

Coin Silver Mining Co., 1/5c a share. Delinquent October 29. Sale day November 29.
Utah Asphalt Co., 1/4c a share. Delinquent October 31. Sale day November 21.
Eureka Bullion, 1/2c a share. Delinquent November 4. Sale day November 23.
Syndicate Mining, 1 1/2 mills. Delinquent October 27. Sale day November 9.
Tintic Empire, 1/2c a share. Delinquent November 12. Sale day December 5.
Lynn Big Six, 1c a share. Delinquent October 10. Sale day November 15.

METAL MARKET QUOTATIONS, OCTOBER 8th

Silver 99 1/4c.
Silver in London 41 1/2d.
Copper 12 1/2 @ 13 1/4c.
Lead \$4.70 @ \$4.75
Spelter (East St. Louis) \$4.60

ORE SHIPMENTS

During the two-week period ending on the 7th, Park City mines shipped a total of 3,728 tons of ore, or 479 tons more than during the previous two weeks, as follows:

Judge Allied Companies 1,288
New Quincy 45
Ontario Silver Mines 803
Silver King Coalition 1,592
Total tons 3,728

For the two weeks ending on the 7th the mines of the Tintic district shipped 314 carloads of ore to the mills and smelters, as follows:

Tintic Standard 98
Chief Consolidated 78
Iron Blossom 23
Victoria 22
Eagle & Blue Bell 19
Iron King 17
Dragon Consolidated 18
Centennial-Eureka 6
Colorado Consolidated 5
Swansea Consolidated 7
Gemini 4
Mammoth 1
Gold Chain 2
Bullion-Beck 4
Alaska 3
Eureka Hill 2
Sunbeam 5
Total carloads 314

FOR SALE

2 Fairbanks-Morse Compound Duplex Pumps No. 18916—No. 18-915, 12-18-10-12. The valve areas are large. The arrangement of the water valves such as will give a very direct course for the water through the pump. They may be operated at maximum speed without shock or vibration and with perfect safety to all parts; equipped with large and deep stuffing boxes. The interior may be easily reached through ample sized hand holes. These pumps will stand constant working pressure of 160 lbs. per sq. in. Also 2 Llewellyn Type Hydraulic Type Passenger Elevators, complete, cheap. Address, Hotel Virginia, Long Beach, Cal.

The Salt Lake Mining Review

VOL. 23 NO. 14

SALT LAKE CITY, UTAH, OCTOBER, 30 1921

SINGLE COPIES, 15 CENTS

Large Operators of Utah Join Nevadans To Develop Rich Silver Mines Near Tonopah

Keen interest has developed locally during the month in a rich silver strike made in Nevada a few weeks ago because a number of prominent Salt Lake mining operators are concerned and because, according to reports from Nevada, the strike is expected to start another boom such as followed the discovery of the first mine at Tonopah. The discovery which is causing all the excitement was made during the closing days of September by D. F. Betts and associates of Tonopah, who had secured a lease on one of the claims owned by the Hudson Mining & Milling Company and located about twenty-eight miles north of Tonopah along the line dividing Nye and Esmeralda counties, in what is known as the San Antonio mining district.

The Betts discovery was made on the Golden Eagle claim, about 1500 feet north of old workings on a group of claims owned by the Hudson company. After sinking a shaft to a depth of twelve feet it was estimated that the lessee had taken out not less than \$5,000 worth of ore which, according to samples assayed in Tonopah, runs from 910 to 1,872 ounces silver, with picked specimens carrying all the way from 2,000 to 5,000 ounces silver and around \$12 in gold per ton.

The Tonopah Daily Times, in one of its early articles on the discovery, says the strike "may prove the high-grade magnet that will stampede the world in this direction in the same way that the high-grade ledges of Tonopah and Goldfield formed the lodestone that attracted all creation." Be that as it may, it is evident from the news developing, that new and valuable mineral discoveries are still being made—that all of the silver, gold, lead and copper mines have not yet been found and developed.

District's Possibilities Long Recognized

Many years ago the Walker interests of this city became identified with the district and considerable work was done and, it is said, \$40,000 worth of ore was shipped. Tonopah mining men also got into the district and contentions arose over conflicting claim interests. For several years it seemed that the difficulties could never be amicably "ironed out" by the parties at interest and mining effort was abandoned. Last spring, in order to escape the trials, tribulations and expense of litigation, there was a "get together and compromise" effected which resulted in a consolidation of interests and the final organization of the Hudson Mining & Milling Company, under the laws of Nevada, with a capitalization of \$100,000 in ten-cent shares. One-half of the stock was apportioned pro rata among those concerned and the patenting of the properties was proceeded with, while the remaining 500,000 shares was placed in the treasury.

Strong Crowd at the Helm

In the organization of the company J. R. Walker, head of the Walker Bros. Mercantile Co., and probably the

largest individual stockholder in the Walker Copper Co., was made president; W. H. Royston, superintendent of the Tonopah-Belmont mill, vice-president and general manager; A. H. Jones, formerly general superintendent of milling for the Tonopah-Belmont Co., and now of Salt Lake, treasurer; the other directors being R. J. Kelly and Joseph Wilson. In addition to these J. Frank Judge and Charles A. Walker, of Salt Lake, both well known financiers and mining operators, and Flaminio Tabarracci of Tonopah, are directly identified with the formation of the new operating company.

Following the formation of the company there was a scramble for leases at various points on the company's



MOUTH OF 300-FOOT INCLINE SHAFT ON THE BEST CHANCE CLAIM—DUMP AND ORE BIN

possessions, embracing seventeen claims in all and the Betts lease has been the first to disclose rich ore in virgin ground, as previously explained. Previous development of properties held by the different parties in interest, resulted in the sinking of five or six shafts on different veins to depths varying from fifty to 225 feet. Ore is reported in all shafts which were sunk on the Best Chance claim. One incline shaft has been sunk 300 feet on the vein, which pitches at an angle of 30 degrees, while the recent strike of the Betts lessees is located 1,500 feet north of the old workings, is apparently on the same vein, and is said to be the richest discovery of all.

Previous Ore Shipments

Most of the \$40,000 worth of ore previously mined from the properties was produced in a period extending over about fourteen months and the bulk of it found a market at the Salt Lake valley smelters, because it contained a small percentage of lead. This ore ranged in value

from \$60 to \$90 a ton. One carload realized \$4,010, another \$3,200 and two cars that were treated at the cyanide plants around Tonopah yielded between \$88 and \$90 a ton, according to report.

The management of the new company is said to have most definite plans for the future operation of the properties, including the mining, treatment and marketing of the product and, with such practical engineers and milling experts as W. H. Royston and A. H. Jones in the official household, supported by men of such financial standing as the Walkers and J. Frank Judge, there is every reason to believe that, boom or no boom for the San Antone district, the Hudson Mining & Milling Company will do its full share in reviving interest in the western metal mining industry.

A report received just a few days ago from W. H. Royston, manager of the Hudson Mining & Milling Company, by A. H. Jones, stated that leases had been granted on the Golden Eagle, the Sunnyside, the C. O. D. and the Little Bill claims. Applications for leases on several more claims have been made, according to Mr. Royston's report.

On the Betts lease in Hudson ground work is progressing steadily. A shipment of fine ore has already been mined, writes Mr. Royston. Recent information from Tonopah stated that a sample of twelve inches of the hanging-wall of the vein in the Betts shaft assayed \$910 in gold and silver. Sample No. 2, a check on No. 1, gave a return of \$1314. No. 3, a sample of seven inches on the footwall of the Betts vein, assayed \$1872. These samples were taken, according to information sent to Mr. Jones, but a few feet below the surface. The ore, it is said runs about one ounce of gold to 1,000 ounces of silver.

SEMI-PYRITIC ORE TREATMENT IN COLORADO

By A. S. Walter, E. M.*

The mining and smelting industries in Colorado face a peculiar situation. The ordinary lead smelting practice which is the general method of extracting values in Colorado at present demands certain ore reserves of which the available are being rapidly depleted. Direct smelting of crude lead sulphide and lead carbonate ores are the exception rather than the rule. Iron ores are plentiful, but the majority of these carry very little gold or silver. Galena concentrates are available from the Joplin district, but the present price of lead combined with high freight and the subsequent high treatment charges make this source of lead prohibitive.

The lead smelters naturally refuse to accept ore which they cannot smelt at a profit. This latter named ore is mainly a medium-grade silver, highly siliceous, dry ore—dry, meaning little or no lead content. The mine-owner cannot afford to do extensive development work to furnish the ore he can ship and at the same time leave good grade ore untouched because there is no market for it.

Milling Plants Have Limitations

One by one mines have ceased operations until now only a small tonnage is being received at the lead smelters of this state. Mills are suggested as a panacea, and some activity is noticeable along these lines, the arguments advanced in favor of this treatment being to concentrate the values high enough to overcome the freight rate barrier and to make a product acceptable to the smelters. Those

familiar with wet concentration methods know the practical limits of value-saving in the majority of the mills.

The Cripple Creek district has a satisfactory method in use. Most ores in this district yield to cyanidation. Some pyrite concentrates are shipped direct to the lead smelters. Large bodies of good grade copper sulphide have been opened up in this state and an outlet for these ores would develop more.

The Semi-Pyritic Blast Furnace

The way out of this dilemma is the semi-pyritic blast furnace or copper matte furnace. A copper matte furnace can be run very nicely with a slag running 10 per cent higher in silica than a lead furnace slag, less iron is required and limerock can be utilized if iron is too low. The copper matte furnace requires less coke on the charge, as the heat of combustion of the raw sulphides replaces it.

The 38-inch by 180-inch at tuyeres semi-pyritic furnace is capable of treating 250 to 300 tons of charge in twenty-four hours, whereas a lead furnace is doing exceptionally well to average 200 tons charge in twenty-four hours. Since the Cottrell precipitator has been so successful in cleaning furnaces, the semi-pyritic furnace stands out prominently. The volatile lead and zinc can be saved and utilized.

Electric Furnace a Possible Factor

The slags from copper matte smelting as has been practiced in Colorado at the Independent smelter at Golden, Colo., especially, yielded an exceptionally clean slag. The electric furnace may become a factor in ore treatment if cheap power is available.

Processes employing preliminary chloridizing and sulphatizing roasts are being perfected. Electro static methods of separating zinc from complex ores has made a marked saving of this metal which heretofore was lost in the lead smelting practice.

Colorado has a brilliant future in store when the processes in use will treat the ores in sight instead of trying to find the ores to meet the process. A large tonnage of ore susceptible to the semi-pyritic treatment is now opened up and awaiting the stimulus it needs.

C. AND A. BUYS RICH GOLD-SILVER MINE

Reports from Lordsburg, N. M., to the Las Cruces Chamber of Commerce are that the Calumet and Arizona Mining Company has acquired the famous Norman King and Ballali group of mines in the Steeple Rock district in New Mexico. The properties, which were owned by H. W. Evans and L. C. Butler, were discovered more than 20 years ago. Development work was done on the Ballali group by the Carlisle Development Company, under the direction of Herbert C. Hoover, secretary of commerce and labor in President Harding's cabinet.

The Norman King mine was held until 1918, when it was opened up by John Christy, who shipped close to \$50,000 worth of ore. It has a 150-foot shaft, but most of the workings are on the 100-foot level. Messrs. Evans and Butler took over the property in May, and since then have developed considerable ore, and recently shipped a carload of high-grade. A recent assay from a high-grade streak, six inches wide, in the southeast drift, showed 22 ounces gold and 1,300 ounces silver to the ton.

*In the Mountain States Mineral Age.

NEW COAL, METAL AND OIL COMPANIES ARE PERMITTED TO SELL STOCK

Within the past two weeks the state securities commission has issued permits that will make it possible for several coal, metal mining and oil companies to go ahead with their financing. The most notable among the permits granted are those affecting the coal companies and they indicate that much money is to be spent and several big, meritorious propositions are to be whipped into shape in the near future. One of these is the Great Western Coal Mines Company, which has been granted authority by the commission to sell \$300,000 worth of securities. This company has been organized in Salt Lake to develop a new property in the Salina canyon district in which there are estimated workable coal measures containing 75,000,000 tons. This company has a capitalization of \$3,000,000 and owns holdings of 3,692 acres of coal lands, a townsite, range and timber lands, as well as approximately 20 second feet of water located just above the Utah Coal road in Gordon Creek.

The company proposes to sell \$300,000 worth of 8 per cent first mortgage gold bonds upon the following terms: It is permitted to issue 225,000 shares of treasury stock at a ratio of three shares for each dollar received from the sale of money to the company for re-organization and development purposes; the company has the right to issue one share of treasury stock for each dollar invested in the bonds together with a sale commission of 20 per cent and an additional 5 per cent for advertising purposes.

The Great Western company will undertake to provide proper accommodations for miners on the 500 acres owned as a townsite and on which the company proposes to erect houses, which with the water rights, it is estimated will net the company \$225,000. The total acreage in the project is 4,500, of which about one-fourth has been brought under cultivation yielding this year 800 tons of hay.

Gordon Creek Coal Co. Also in Line

The Gordon Creek Coal Company organized at Salt Lake with a capitalization of \$100,000, all of which is outstanding, was given permission to sell \$200,000 worth of first mortgage 6 per cent bonds with a 20 per cent sales commission and an additional 5 per cent for advertising. The property of this company is located west of the Great Western Coal Company's lands and consists of 240 acres of patented land and 1,480 acres of government land subject to the regular royalty.

Salina Canyon Company Another

The commission also has granted the Salina Canyon Coal Company permission to dispose of \$50,000 worth of the company's \$500,000 closed first mortgage ten-year bond issue in Utah. The remainder of the bonds are to be sold in Maryland. The entire capital stock consisting of \$100,000 is held by the officers. Holdings consist of 1,887 acres of coal land in the Salina canyon and part title to 523 acres of additional land nearby. Negotiations have been entered into to lease 5,000 acres additional land from the government. It is estimated that 90,000,000 tons of recoverable coal underlies the property which is located on the new branch of the Denver & Rio Grande being constructed. A sales commission of 20 per cent is authorized.

New Railroad to Serve Mines

The National Railway Company has undertaken to build the six and one-half miles of railway necessary to tap the Great Western, National and Gordon Creek properties.

The Great Western is to do all the grading for the road, at an estimated cost of \$130,000, for which stocks and bonds will be given by the railway company. Upon completion this road is to be taken over by the Utah Coal road on the opening up of these three additional coal properties.

Equitable Coal Co., a Mutual Concern

The Equitable Coal Company of Salt Lake, organized with a capitalization of \$500,000 in \$10 shares, was authorized by the commission to sell 5,000 shares at par for the purpose of opening up and developing its property near the Castle Gate mining district No. 2. Basic assets consist of 320 acres of coal land on which a diamond drill has disclosed a 28-foot vein of coal, according to the report of the commission's secretary.

It is the plan of this company to operate as a mutual company and to sell the stock to men who will be in position to accept the agency for the coal and handle the coal on the general market and to operate coal yards in the different cities and towns. The permit to sell \$50,000 worth of securities is granted with a sales commission of 15 per cent, under the agreement that as soon as the \$50,000 securities have been sold the company will apply for a permit to sell enough additional stock properly to open up the properties, which is estimated at \$225,000.

Permits to Metal Mine and Oil Co's.

The commission authorized the Copperopolis Mining Company of Park City to sell 50,000 shares of stock at 5 cents, the stock to be sold at the company's offices without commission. The company has 12 unpatented lode mining claims in the Blue Ledge mining district.

The Silver Contact Mining Company of Salt Lake was authorized to dispose of 100,000 shares of treasury stock at a maximum price of 5 cents with a sales commission of 25 per cent and 5 per cent for advertising. Holdings of the company consist of three claims in the American Fork mining district.

The Castle Dale Oil Company of Salt Lake was authorized to dispose of 25,000 shares of stock at a maximum of \$1.50 per share with 15 per cent allowed as sales commissions and an additional 5 per cent for advertising. The company has holdings on the Castle Dale, Rochester, Hill Creek, Randlette, Stewart and other domes in Utah and has been drilling on the Castle Dale dome for more than three months reaching a depth of 800 feet. A second rig has been erected on the Rochester anticline and is ready to spud in. A cash balance is on hand of \$5,000 and the company is maintaining a payroll of \$1,800 a month.

The Deseret Oil & Refining Company of Salt Lake was authorized to sell \$100,000 worth of its stock in \$1 shares with a sales commission of 20 per cent and an additional 5 per cent for advertising. The company is capitalized for \$500,000 and has holdings aggregating 6,000 acres of oil land in the Fossil Field in Wyoming on what is reported to be a producing structure.

A report from Platteville, Wisconsin, states that a Zinc tailing brick manufacturing plant is being established there and that samples of this type of brick have favorably withstood severe tests.

MINES IN KATHERINE DISTRICT ARE BEING RAPIDLY OPENED UP

By William P. De Wolf

Kingman, Arizona, October 22.—Gold Mining operations in the Katherine district were amplified last week by the starting of crosscutting in the Gold Chain and the Katherine Extension workings; by the placing of machinery at the Katherine and Revenue properties; by a marked change of formation and increase of gold values in the Adams shaft; by the discovery of free gold ore for a length of 200 feet along the strike of the vein on the Nevada-Katherine property and by the financing of a number of the mining groups in Los Angeles and other financial centers.

At the Gold Chain mine, where approximately \$1,000,000 worth of ore is already in sight after less than a year's work, a crosscut has been started in the east drift on the 100 foot level at a point 350 feet from the shaft. There is a slight faulting of the vein at this point, hence the new crosscut to and through the 46-foot vein will be somewhat longer than the two crosscuts already driven.

The big east-west bearing Gold Chain vein was first crosscut directly at the shaft, and at that point sampled an average of approximately \$16 gold a ton. Like values prevail in the second crosscut through the vein, and the mineralogical conditions favor the prevalence of like values at the present point of operation.

Crosscutting to the northeast continuation of the rich Katherine vein was started last Tuesday at a depth of 250 feet in the Katherine Extension shaft, with the conditions favorable for early contact therewith. The Katherine Extension property adjoins the Katherine mine, and in the third property in the Katherine district to open and develop ore. It is well equipped with mining machinery and is being worked under the supervision of Sam Brethour, formerly a successful mine leaser and contractor at Cripple Creek and other Colorado camps. A complete financing of the Katherine Extension is said to have been accomplished in Los Angeles.

The shares of the Katherine Gold Mining Company are to be listed very soon on the New York curb. Chas. Sutro, President of the Company, so stated last week, when he inspected the bonanza Katherine mine, accompanied by E. W. Clark, of the Union Oil Company of Los Angeles, and Ben Goodwin, a prominent insurance man of San Francisco. These gentlemen expressed themselves as well pleased with the conditions in the Katherine mine, and said they believed it would soon become one of the great gold producers of the west.

A powerful compressor and hoisting engine have been ordered for the Katherine mine, to take the place of the equipment now in service at the collar of the shaft. The latter will be removed to the Pyramid property, also controlled by the Sutro interests, and will be utilized for development of the southwest extension of the big Katherine vein. As soon as the new equipment is in place at the Katherine shaft, the working force will be largely increased, and development will be prosecuted much more rapidly than in the past. A 25 horse power hoist and a No. 5 Cameron sinker pump went into commission last week on the 400 foot level, in the Katherine workings as a means of expediting the sinking of the winze located near the face of the east drift at that depth. A 50-ton ore pocket has also been erected near the collar of the winze. As the winze is deepened the gold values are holding strong at the returns received at a depth of 22 feet therein.

Grab samples of the ore at the 22-foot point gave gold returns of from \$16.40 to \$320 a ton. These returns are considered indicative of the value of the ore that will be opened by means of the winze in the area between the 400-foot level and the proposed 700-foot level.

At the Revenue property a 25 horse power hoist and a powerful compressor plant went into commission a few days ago. Shaft sinking has been resumed at a depth of 60 feet and will continue until a depth of 400 feet is gained. There a crosscut will be driven to the continuation of the big Gold Chain vein, one of the strongest and best mineralized in the Katherine district. Other surface improvements recently made at the Revenue include the erection of buildings for the accommodation of employees. Development work is in charge of Henry Johnson, who has mined successfully in Mexico and elsewhere.

Late reports from the Adams property state that the quartz replacement of calcite in the big vein continues to increase as depth is gained, and that at a depth of 7 feet grab samples of the ore give a very high gold return. At the Comstock Consolidated property, located to the east of the Adams, plans are being made to develop the continuation of the Gold Chain vein at depth. The Comstock Consolidated adjoins the Gold Chain mine and the east strike of the rich Gold Chain vein carries it through the center of the Comstock group. The property has been financed in Los Angeles, through the agency of Senator James Curtin, one of the principal owners.

The Nevada-Katherine property, located in the Territory, Nevada section of the Katherine district, has also been financed in Los Angeles. Prospecting of the vein outcrop is now being done for the purpose of selecting the site for a double-compartment shaft. The surface work to date has resulted in the discovery of free gold quartz for the Katherine vein. On the tunnel level the vein assay a length of 200 feet along the southwest continuation of the vein as high as \$1,471 gold a ton. Machinery is to be installed at once and the vein opened at depth by three shifts of miners.

NEW ORE TRAFFIC IN NORTHWEST

The Great Northern railway has issued a tariff on ore between all points on its line in this region and Bradley, Idaho, where the Bunker Hill smelter is located. It will become effective on November 21, according to information received by Frank M. Smith, smelter director for the Bunker Hill & Sullivan Mining & Concentrating company, with offices in the Paulsen building, Spokane, Wash.

The tariff creates freight rates where none existed and will make the smelting services of the Bunker Hill available to producers in a wide area on the Great Northern lines, said Mr. Smith recently. It will open the smelter to the gold, silver and lead of Stevens county, the gold and silver of Okanogan county, the gold of Republic, the gold, silver and lead of British Columbia and the silver and lead of Troy and Libby, Montana.

The tariff covers the Great Northern line east to Libby, west to Wenatchee and north to Nelson, B. C. and the branches to Republic, Oroville and Ruby. Every station on the lines affected is mentioned. The minimum rate is based on ore having a value under \$30 to the ton. An addition of 25 cents a ton is made for each increase of \$1 in value up to and over \$100 a ton.

The O. W. R. & N. and the Oregon Short Line have established tariffs between points on their lines and the Bunker Hill smelter but the Northern Pacific has issued no rate except from points in the Coeur d'Alene region and the smelter, said Mr. Smith.

BLACK METALS MAKING BIG MINE

High-grade silver ore has been encountered in the Black Metals mine near Pioche, says the Pioche Record. As a result of the strike as well as general conditions, Superintendent James Quirk, who recently took charge of the operations, expresses himself as greatly pleased with the results of the development campaign recently commenced under his direction. In the northerly incline heading on the 325-foot level of the Black Metals mine, which was in barren lime when active work ceased on the property last year, rich carbonate ore was struck on the 250-foot point.

Specimen pieces assay as high as 1000 ounces in silver per ton. Average sampling of the face of the incline gave the following results: Eight feet at top of stope face, silver, 27.6 ounces; 8 feet across bottom, silver, 35.2 ounces per ton.

A large tonnage of ore has been mined from the beds adjacent to the 325 level, where Superintendent Quirk has been engaged in extending both ends of the big stope. From this territory and on the same fault plane, the Black Metals company shipped one car of fifty-four tons of ore which netted the company over \$17,000, besides which a considerable percentage of the fluxing ore shipped was mined from this profitable section of the mine.

A distance of 750 feet now separates the extensions of the stope extremities and both headings are in ore. The southeasterly or "A" bed end is opening up a tonnage of 100-ounce ore, containing only 1 per cent of insoluble content. A small profit will be realized from the marketing of this fluxing ore.

Large Tonnage Available

In the northwesterly end, which dips under the hoist on the 300-foot or tunnel level of the mine, eighteen feet of high-grade fluxing ore has been opened up and several thousand feet of virgin ground remains to be developed in this territory.

Ore from the new strike is now being hoisted. The first 100-ton lot will be billed out today to the Salt Lake smelters on favorable contracts owing to the ore's low insoluble percentage and high lime-manganese-iron content. Besides the satisfactory development on the 325-foot level, shipping ore is being mined on the 700-foot level. This level also has produced large quantities of ore. Stopes, some over 200 feet across and fifty feet high, attest to the activity of former operators.

Already the Black Metals mine has produced over 250,000 tons of silver fluxing ore and is credited with being the third largest producer in the Pioche district. The records show that the first class ore averaged over thirty ounces of silver to the ton, some cars in the past having carried high values in silver, lead and copper.

Mineralization is Persistent

The ore makes off into the permeable lime beddings adjacent to the fissures. These beddings maintain an average grade, except when closely connected with the fissure system, where near inter-sections may be found bodies of extremely high-grade ore. Around these cores of soft low carbonate ore, large bodies of fluxing ore are invariably available.

The lime beddings of the Bristol mines dip into the Black Metals property. A number of fissures that strike through the Bristol mines continue on through the Black

Metals. The mineralized zone in these estates embraces the intersection of two fracture zones, which are each over 200 feet wide.

There are at least four series of limestone beddings above the quartzite. Only the upper series has thus far been developed, the total production to date being derived from the upper series.

PORTION OF COMSTOCK VEIN

STILL IS "VIRGIN" GROUND

That the main Comstock vein has never been explored in the Union Con. mine is the astonishing statement made by President R. L. Radner of San Francisco, who was in Virginia City recently to inspect progress in the crosscut on the 1630-ft. level that is believed to be near the hanging wall of the great lode, says the Nevada Mining Press. This work was undertaken by the company in March under the direction of Supt. Alex Wise after making connection with the Sutro drainage tunnel, and the crosscut is now in 610 feet. A clay seam was cut recently which was believed to be the cleavage plane of the hanging wall, but subsequent work proved this to be untrue. The heading is getting close, though, and any shot may bring it into the lode.

According to the history of the Union dug up by President Radner the company figured sensationally in the stock market during the bonanza days through a fight for control that was waged between Mackay, Fair, Flood and O'Brien of the "bonanza firm" and officers of the Sierra Nevada Mining Co., its neighbor on the north. The Union had driven a crosscut out to the lode on the 1750-ft. level and is said to have struck ore of good grade. As this work has long since caved it is impossible to check these legends. About this time the Sierra Nevada is said to have followed an ore-body from its workings into the Union and the "insiders" started to buy the stock and get control. The fight was close, the bonanza crowd winning by the purchase of one block of 5,000 shares for \$1,000,000, in government bonds. James G. Fair, then manager of the mines controlled by the "big four," declared then and there that the Union would never be operated while a share of stock was owned by the Sierra Nevada crowd.

The Union has 600 feet on the Comstock lode, lying between the Mexican and the Sierra Nevada. Its production of \$1,741,000 is said to have come from a vein far out in the hanging wall country, 1,000 feet east of the shaft.

The Comstock lode was not highly productive in the Sierra Nevada, which produced but \$1,350,000, nor in the Mexican mine except at great depth. The miners of those days, though, were after bonanza ore; nowadays they are looking for big deposits of low-grade. The Union may afford this and it is not improbable that some bonanza ore will be found. The situation is interesting.

GOLD STRIKE MADE, DRILLING FOR OIL

According to the Wyoming Oil News, the Cleveland-Wyoming Oil Co., drilling on 4-43-82, Kaycee dome, northwest of Salt Creek, in a search for oil, is reported to have run into blue shale at 700 feet which gave evidences of containing gold. Field Manager J. E. McClory, who has had experience in placer mining, had samples taken and sent to company's headquarters in Cleveland, Ohio, for analysis, which assayed \$1,427.51 to the ton. Gold is said to have been found to exist in leaf form in addition to that found in smelting the pyrites of iron. Diamond drill holes will be put down to explore the extent of the deposit.

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*Illustrated.

SOLDIER HOSPITALS SHOULD BE AT POST

We note that there is renewed effort on the part of Senator King, of Utah, to have the government purchase and take over some of the local hospitals in which to care for disabled soldiers. While it may seem a little out of place for a mining publication to discuss propositions of this nature, the privilege is claimed to exercise the right of a citizen to take a stand on any question involving public policy. Therefore, the Mining Review begs to suggest that Salt Lake City is not the place for an institution of the character contemplated. It is only a few minutes' ride from the heart of Salt Lake to Fort Douglas on the brow of the hill overlooking the city, where the air is pure, the water is pure and where all conditions are ideal for the maintenance of government hospitals. There are acres of substantial stone and brick buildings there that could be quickly converted into splendid hospitals at modest cost in which patients could be given the best of care in pleas-

ant surroundings, removed from the bustle and clang of business energy and noise.

No site that could be purchased in Salt Lake would compare for a minute with Fort Douglas and the time and money that would, of necessity, have to be squandered in buying local hospitals and converting them into capacious institutions such as the government now so sorely needs, would be inexcusable. If it is necessary to get rid of some of the local hospitals, why not dispose of them for apartment house purposes? If the buildings and sites are undesirable for private or city hospital purposes, why try to slough them off on the government? Sick and disabled soldiers are entitled to better consideration than this local hospital scheme contemplates. Let us hope that Director Forbes, of the veteran's bureau, will not be inveigled into making any such "deals" as are being worked out.

GETTING READY FOR BUSINESS

From practically every metal mining camp of the west word comes that all preparations have been made, or are making, for a full winter's activity. More miners are now employed than at any time during the present year and from all directions comes word that development work, particularly, is to be crowded during the winter months. These reports augur well for the future of the metal mining industry. They indicate perfect faith on the part of operating companies that during the winter there will be a readjustment of freight rates, smelting charges, costs of materials and supplies, etc., and that industrial, commercial and economic conditions will have been sufficiently clarified so that good markets and profitable returns will be realized during the year to come.

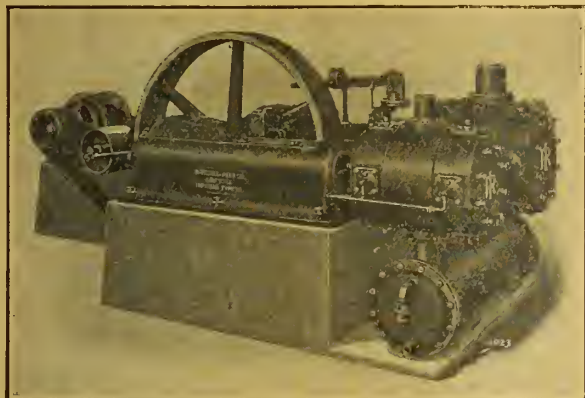
It is particularly noticeable that "war profiteering" in essential commodities, including foodstuffs and clothing and household goods, is on the wane. Prices are rapidly approaching normal—rapidly approaching the point where \$3 will go farther than \$5 did six months to a year ago. This means that the trimming of wage scales will not work hardship, and it also means that railroads can reduce freight charges on coal, ores, machinery, lumber and provisions, so that the miners, stockmen, farmers and ranchers of the west, who have suffered untold losses during the past two or three years, will be able to view the future and its problems with a feeling akin to security and with a heart to "do" which has suffered almost utter collapse in the fight that has been waged. Now, "Let's go!"

The Salmon, Idaho, Herald says: "Proof that times are returning to normal is carried in the report that the state of Idaho has at last been able to sell its \$2,000,000 of highway bonds for cash." We'll say so.

The average oil stock promoter revels in descriptive metaphor concerning "liquid gold" and the resultant fortunes that will follow when it is tapped in the wells they propose drilling with the money their "sucker" clients furnish. But a Wyoming oil company has these gentry backed off the board, if reports are true. On the Kaycee dome, north of Salt Creek, it is said that a well sunk 700 feet has tapped a blue shale stratum that assays over \$1,400 in real, honest-to-goodness gold—not the "liquid" trash.

NEW TYPE OF BELT-DRIVEN AIR COMPRESSORS

The Ingersoll-Rand Company has announced a new line of belt driven air compressors. This type is known as the "Imperial" Type "XCB" and has incorporated in it several noteworthy features of construction, including Ingersoll-Rand plate valves, for both the air intake and discharge, and the 5-step clearance control for regulating the compressor's output. The plate valves used in this type of compressor have been perfected after a most complete analysis of the lightweight plate type of valve. They include the features which have been proven necessary to the successful functioning of this type of valve, the most important of these being, that the valve is supported



"IMPERIAL" TYPE XCB AIR COMPRESSOR

throughout its entire operation in perfect alignment without any form of wearing guide—a very essential feature in the life of the valve.

The clearance control has been used with great success on the larger direct-connected electric motor driven compressors manufactured by the same company and has proven itself to be the most satisfactory and efficient form of compressor regulation. Thousands of these direct-connected air compressors are installed in all parts of the world and are well-known by those in charge of plants where conditions call for more than 600 cubic feet of free air per minute and where direct-connected electric motor drive is used. The use of this form of regulation is a most noteworthy development in air compressor design during recent years and should be of interest to all users of air power. The clearance control is a method of securing extremely efficient operation at partial loads. Under average working conditions it is well-known that the demand for air is seldom steady throughout the working day and for this reason the performance of the compressor at underload is of primary importance.

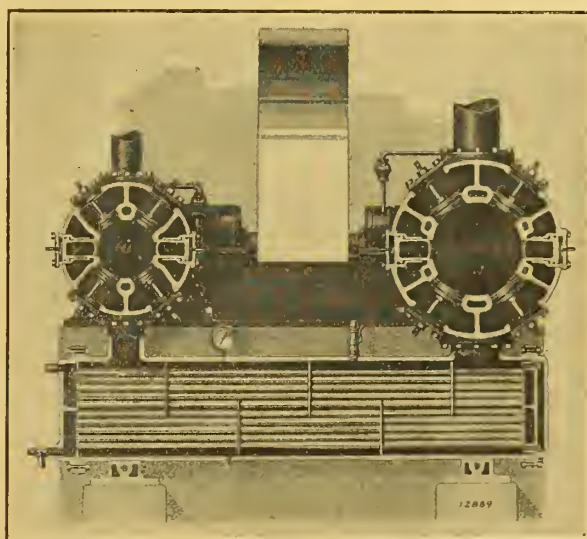
With the clearance control the compressor is automatically loaded or unloaded in five successive steps these steps being obtained by the reduction or addition of clearance space to the air cylinders. The compressor will operate at full, three-fourths, one-half, one-fourth, and no loads and the design of the clearance control is such as to secure efficient operation at any one step, the reduction in input power required being practically in proportion to the reduction in output capacity.

The entire control is automatic. If the compressor is operating at full load and the demand for air falls off this control automatically causes the compressor to operate at one of the underload points such as three-fourths, one-half, one fourth, or no load. When the demand for air is increased the compressor automatically assumes the load in successive steps. An extremely valuable feature of the clearance control is the fact that the clearance pock-

ets are made integral parts of the compressor cylinder and the entire regulation is obtained by the control of the volume of air taken in and compressed.

With this method of control there is no loss of power due to wastage of air and leakage. The clearance pockets in the cylinder are automatically thrown in communication with the ends of each cylinder in proper succession, the process being controlled by a predetermined variation in receiver pressure. With the compressor operating at partial capacity a portion of the air is compressed into an added clearance space instead of passing through the discharge valves. On the return stroke this air expands giving up its stored energy to the pistons.

The inlet valves remain closed until the cylinder pressure equals the intake pressure. At this point the inlet valves are opened automatically and free air is taken into the cylinder for the remainder of the return stroke. Thus the inlet capacity is reduced without reducing the intake pressure. On a two-stage compressor clearance space in proper proportion is added simultaneously for both high and low cylinders giving a constant ratio of compression and maintaining conditions necessary for the highest compression efficiency throughout the entire load range. Another added feature of this control is the maximum demand stop which will prevent the compressor being operated at any higher maximum load than is desired. This can be adjusted so that the compressor will operate on a maximum of one-fourth, one-half, three-fourths, or full load and, under conditions where the load factor is comparatively low, it is of value in reducing the maximum demand, permitting a saving in the purchase of electric power—a feature found in no other type of control. With the clearance control reduction in power required will be in proportion to reduction in output capacity. All the mechanism for regulating the compressor is independent of the compressor running gear.



SHOWING SECTION THROUGH AIR CYLINDER AND INTER-COOLER

The loading and unloading of the compressor is automatically accomplished in steps, the difference between any two steps being small enough to prevent any undue electric current fluctuation.

It will be seen that all of these features are of extreme importance to combination producing conditions requisite for the most efficient operation at full and partial loads. This new type of belt driven compressor equipped with clearance control can be furnished single-stage for low pressures and two-stage for higher discharge pressure. The piston displacement capacity for 100 pounds discharge pressure ranges from 610 to 1505 cubic feet of free air per min-

ute. "Imperial" type "XCB" compressors can also be furnished with the well-known short belt drive attachment with floating idler. This method of drive is now well-known to all users of compressors who acknowledge its advantages in saving floor space, saving in length of belt, and permitting a greater arc of belt contact.

The Ingersoll-Rand Company also announce their new Bulletin No. 3042 in which this new type is described in detail.

WIND-UP OF AMERICAN MINING CONGRESS

Resolutions adopted by the American Mining Congress convention at its final session last week, called for maintenance of the house schedules on mineral products in the tariff bill, for the addition of necessary schedules and for the retention of the American valuation feature. A Chicago dispatch sent out at the close of the session reported the close as follows:

The valuation feature was the subject of considerable discussion in the resolutions committee, but was adopted unanimously by the committee and by the convention.

The place for holding next year's convention will be fixed later by the board of directors. Prevailing opinion is that the directors will select either Milwaukee, Cleveland, St. Louis or Kansas City. The disposition is not to take the convention far from the center of the country until the mining exposition held in connection with the convention has become thoroughly established by another year's experience.

All Officers Reelected

All officers were reelected for the ensuing year. They are: W. J. Loring, San Francisco, president; Daniel W. Wentz, Philadelphia; E. K. Doheny, Los Angeles, and Thomas T. Brewster, St. Louis, vice presidents; J. F. Callbreath, Washington, D. C., secretary.

The exposition closed tonight after record-breaking day for attendance. The Utah state exhibit has attracted much favorable comment this week and the state was formally invited today to place another exhibit next year. More than three-fourths of this year's exhibitors have announced their intention to exhibit again next year.

The Utah exhibit as a whole is well balanced and features the many natural resources of the state in such a manner that practically all visitors to the exhibit hall are attracted to it, and each finds something of interest to hold his attention.

Important Resolutions Passed

In response to a request from Secretary Hoover, the congress passed a resolution providing for appointment of a committee to cooperate with the department of commerce in the production and distribution of minerals. Provision for the committee is an indirect reply, also, to President Harding's request that the congress create a committee to work with the department in the production and distribution of coal. Other resolutions adopted follow:

Call for a conference between representatives of Great Britain, France and the United States for developing a plan by which rates of exchange may be stabilized.

Memorializing congress to create a department of mines, with a cabinet officer.

Appointment of committee to study mines, and placing of personal services of the chief of the tax division of the American Mining Congress at the disposal of state mining organizations desiring expert information on tax questions.

Pledging support of the congress in the speedy reduction of past increases in freight rates.

Calling on the national congress for a more complete investigation of the Colorado river water power project.

Providing for a set revision of the laws to enable those engaged in the mining industry and others to apply the necessary principles of conservation; and further, that the right be given to collect and distribute information to themselves and the public concerning existing stocks, current production and demand.

UTAH OIL DEVELOPMENT REVIEWED

Reviewing the oil development situation in Utah, O. J. Grimes, in the Salt Lake Tribune of the 23rd, says:

Drilling is again under way at Huntington, and the hole is down about 2850 feet. The bit is in hard shale, which may be the capping to the Dakota sandstone. At Castledale work has been suspended temporarily at a depth of a little more than 800 feet, while the camp is being made ready for winter and work on the well in the Hill Creek field is being rushed. No report of progress on the Crescent Eagle well in the Crescent field has been received since the middle of the month, when the hole was down a little more than 400 feet and the Ferron not reached.

Latest reports from the Midwest well in McElmo canyon is that the hole is down 2445 feet with the Goodridge sand not yet encountered. A flow of water made it necessary to case at about 2359.

The Ohio well at Circle Cliffs is understood to be down about 3,000 feet, without anything particularly encouraging, but drilling is being continued. Work on the Caineville test of the Ohio probably will be resumed today or tomorrow. The cement was put down October 5 and the crew given a vacation while the cement set. The drillers returned to the camp yesterday with the intention to resume drilling today if conditions were favorable.

The Carter is reported to be making fair progress on the San Rafael swell with the hole down about 1,400 feet. The Utah Oil Refining still is having trouble with broken stems on the Farnham test, but at last reports had attained a depth of about 900 feet. Nothing definite has been heard from the Leonard camp in Salt Wash other than that the job of cementing the cellar has been completed and drilling is under way.

Practically no drilling has been done during the week by the Western Empire Petroleum at Coalville. Attention has been devoted almost entirely to preparations for the winter, and operations are all but suspended. It is the intention of the management to resume drilling in March if weather conditions are favorable. The hole is down a little more than 200 feet.

In the Rozel region, at the north end of Great Salt Lake, the Leonora and the Salt Lake Asphalt are drilling, but no developments of startling character have been reported. The Leonora was delayed two or three days during the week awaiting some extra lengths of pipe to shut off water encountered at a depth of about 130 feet. It is understood that an elaborate development program for the district has been outlined by other interests, but the work is not yet under way.

The Hyland Oil & Refining company has been organized for the purpose of developing holdings in the Hill Creek country. The company also has property in several other Utah and Wyoming fields. The organization is headed by former State Senator John H. Wootton, who also is president of the Hill Creek Oil & Refining company, on whose property in Hill Creek the Castledale Oil Company is reported to be drilling. The well was reported spudded in almost two weeks ago, but nothing has been heard concerning the progress on the hole.

SILVER KING CON. CONDITIONS GRATIFYING TO PRESIDENT SPIRO

Physical conditions in the Spiro tunnel workings of the Silver King Consolidated Mining Company at Park City, Utah, are exceedingly gratifying, according to Solon Spiro, president of the organization, who has been visiting the property after a prolonged stay in the east. Even though the development of the mine was closely followed by Mr. Spiro while in the east, he reports that conditions are even more gratifying than he anticipated. Mr. Spiro was especially impressed by the fact that in all the raises put up to explore the Park City formation, excellent showings of high-grade ore have been opened. When these deposits are developed they will, he believes, open into large bodies of shipping ore.

The most important consideration with regard to development in the Spiro tunnel, he says, is the fact that for a distance of 1500 feet the company has the Park City formation with a sequence of strong mineral bearing fissures—the same formation which in the properties to the east has produced scores of millions of dollars.

For some time past the management has been testing out this remarkable territory by raises on and drifts along the various fissures exposed in the tunnel in order to select the most promising channels for continuous development. Regarding the showings in these workings, Mr. Spiro said that no better starting points could be asked than the ore lenses in the Iron drift, the blanket of high-grade near the contact raise at the 175-foot level and the ore bed recently encountered southeast on the 175-foot level. While none of these exposures, says Mr. Spiro, are of commercial importance as yet, all apparently are offshoots of parent bodies of magnitude and richness.

The iron ore coming from above in the west extension of the Iron drift, Mr. Spiro says, is rapidly crowding out the pyrite and is plentiful enough to save. In an incline down from the 175-foot level he found the ore bed from six inches to two feet thick. On the 275-foot level southeast is a well defined bedded deposit of copper, copper-silver ore associated with a porphyry intrusion that he says is a delight to the eye of a mining man.

The main breast of the tunnel, according to Mr. Spiro, which is now within approximately 200 feet of the Comstock shaft, is seamed with crevices containing copper and pyrite. If the D. & M. fissure maintains its dip on the surface it should be cut in another sixty feet.

As to the prospect drift from the No. 1 raise, Mr. Spiro says an ore horizon cutting a limestone of so ideal a composition for the deposition of mineral is being followed that values are expected at any time.

UTAH-IDAHO MEN BUY COLORADO MINE

A group of Idaho and Utah men who have furnished capital to operate the Bell mine at Montezuma, Colorado, returned from the property about the middle of the month and reported more than \$400,000 of silver, lead, zinc ore averaging \$93 a ton, fully developed in the mine. They expressed the opinion that they have secured a property which will prove to be a bonanza. Those who made the trip are Victor Engstrom and W. A. Heath of Idaho Falls, Idaho; George S. Campbell of Blackfoot, Idaho; Henry Lewis of Lehi and George A. Short, consulting engineer, of Salt Lake.

The mine was last worked in 1902 but the workings were found to be in such good repair that a force of four men, who were put to work under Arthur N. Sweet, mine manager, are expected to complete repair work within a few days when production will be started with an increased

working force. An operating company is to be organized during the coming week of which Mr. Campbell will be president.

Smelter settlement sheets for nineteen shipments of ore made when the property was last worked show average values of 136.4 ounces of silver, and 42.9 per cent lead a ton and four shipments averaged 50 per cent zinc. An assay survey of the ore body blocked out in the mine, they say, shows average values of 25.27 per cent lead, 35.69 per cent zinc, 12.85 ounces silver a ton, and this block is estimated to contain 6,000 tons of ore. In addition there is partially developed several hundred tons of ore that will assay better than 100 ounces silver per ton.

According to Mr. Short's report about 50 per cent of the galena can be hand sorted into a product carrying 100 ounces silver and 40 per cent lead, while 40 per cent of the zinc ore can be sorted into a shipping product carrying 50 per cent zinc. The remainder of the ore will have to be milled. The zinc is a clear resin blende amenable to standard milling concentration.

SPECIALLY DEvised COKING PROCESS WORKS WELL ON UTAH COALS

The obtaining of a good grade of coke from coals which seemed devoid of any coking property has been accomplished by investigators at the University of Illinois, working in cooperation with the United States Bureau of Mines, by the employment of a specially devised low temperature coking process. As a result of the process, valuable by-products, in the way of ammonia, gas and tar, are derived.

The experiments were undertaken in connection with an investigation by the Bureau of Mines of the smoke problem at Salt Lake City, Utah. It was found that coke was regularly obtained from only a few coals tributary to the Salt Lake City district, and, if the use of coke, a smokeless fuel, was to be increased in that city, it would be necessary to demonstrate the possibilities of coking coals not regularly used for that purpose. Six coals from various Utah districts were tested.

Although, so far as present standards of coking indications are concerned, the coals tested seemed quite non-coking, treatment by the methods devised by Professor S. W. Parr of the University of Illinois resulted in a yield of good coke amounting to approximately 60 per cent of the coal employed. The coke is dense and of good texture, and seems adapted to use as a domestic fuel and for metallurgical purposes. In some respects the coke seems superior to anthracite for use in domestic furnaces. Slightly more than 20 pounds of ammonium sulphate, valuable as a fertilizer, were recovered per ton of coal coked. The gas recovered as a by-product is especially suitable for utilization in city mains. The tar oils obtained should lend themselves readily to cracking processes, thereby furnishing a product suitable for motor-fuel purposes, and may also prove a source of creosote oil and other wood preserving materials. These tar oils, on account of their marked drying properties, may also be available for paint and varnish manufacture. Other uses suggest themselves, such as direct combustion in engines of the Diesel type, as fuel for steam generation, as a source of heat for metallurgical purposes, the carbureting of water gas, and as the source of pitch as a binder for the briquetting of breeze, lignite fuels, etc.

The results of the investigation are of two-fold importance, indicating the possibility of coking many coals not generally considered to have coking qualities, and also constituting a factor in the solution of the smoke problem in communities not favorably situated for the obtaining of smokeless fuel.

EASTERN MEN BUY INTEREST IN OLD CHARLES DICKENS MINE

Chase A. Clark of Robinson Bar, accompanied by Charles Willard, General Manager of the Big Four Railroad Co., with headquarters at Indianapolis, Indiana, and Harry Snyder of the Marmon Car Manufacturing Co., of Danville, Illinois, arrived in this city yesterday just in time to catch the train, says the Mackay, Idaho, Miner of the 12th.

The distinguished visitors arrived here two weeks ago in their private car for a visit with Mr. Clark and family at Robinson Bar, from which point they outfitted for a big game hunt, in which each were successful in killing a fine buck. Fourteen days were spent in the wilds of Central Idaho on a pack trip down Loon Creek over to the Middle Fork and down the Middle Fork to Indian Creek.

Both of the gentlemen were impressed with the splendid opportunities of the Central Idaho country and fell completely in love with the district, not only from a scenic standpoint but also from the standpoint of investment. Mr. Willard became interested in the ownership of the old Dickens Mines at Custer, which are owned by Chase A. Clark, Lew Clawson and Alex Burnett, he having purchased a one-fourth interest in the property. An arrangement was entered into by the owners whereby a force of men will be put to work on this old property during the coming winter months.

The Dickens property is one of the famous old properties of Custer County, being rich in gold and silver. This is the first time that any active interest has been shown in the property for a number of years, and the operations may be expected to bring forth splendid results and revive gold mining activities in the upper country.

MYSTERIOUS GOLD DISCOVERY

Mystery surrounds a reported rich strike of gold ore supposed to have been made by a stranger at the east end of the Harmony range of mountains, near what is known as the "Giant's Grave," a small mound that stands away from the main mountain and is only about five miles from town, says the Winnemucca, Nevada, Star of the 17th. Ore shown here is alive with gold in patches and gobs and resembles the fabulously rich ore taken from the once famous Indian Ike mine in the Humboldt range. The stranger said that he was prospecting in that section a few years ago when he made the discovery of the wonderfully rich ore and has returned, he said, to work on the claim and determine the extent of the find. A few sacks of the rich stuff would make him rich. The ore is a white quartz and any of the samples shown would make fine jewelry. When questioned regarding the find he said that he called the section where the discovery was made, "The Devil's Graveyard."

During the past few days a number of local prospectors made hurried trips to the Giant's Grave section but none were able to locate the claims on which the supposed strike was made.

A number of years ago one of the Sloan brothers, while riding horse-back from Golconda through one of the low passes in the mountains in that same section, picked up a piece of float quartz as big as his hand that showed many colors of gold. Up to this time the ledge from which the rich rock came has never been found.

RICH STRIKE IN LEADVILLE MINES

Gerlack, Nev., Oct. 22.—The Leadville Mines has a very important development on 300-foot level. It is from this level that so far over \$100,000.00 has been extracted and now it looks as though the richest ore is just ahead of the face of the drift on the 300. This drift recently entered a fault and is now about through it. The face shows some very rich ore of a character that leads the management to believe that they have struck one of the rich ore shoots that were often encountered in the early days of the mine. It was in the ore just beyond this fault that the old management found their best ore. The formation in which the face of the drift now is, conforms exactly with that shown in the old workings. The previous management never made much attempt to develop the property below the 200-foot level. The new owners followed a different policy and instead of working through the old Harnan shaft started their work through a tunnel that cut in at about the 200-foot level of the shaft. From this tunnel a winze was put down to the 300 and then drifting along the vein disclosed the downward extension of the ore shoots. The drift from the winze is now in about 600 feet and has passed the point that the old Harnan shaft would have penetrated had it been continued to the 300-foot level. It is just beyond this point that the new strike has been made.

For months the Leadville has been sending out about three carloads of concentrates a month. This brought their gross production to about \$25,000 a month. Heretofore the mill has been handicapped for sufficient water supply. Recently this has been overcome by the laying of more pipeline also the development of water in the mine. The mill capacity has now been considerably increased and this with the opening of new ore bodies has greatly increased production. The gross production of the Leadville now is well above \$30,000 a month.

UTAH'S MINERAL EXHIBIT AT CHICAGO

Utah's exhibit at the International Mining Exposition, which opened in Chicago on the 17th in connection with the annual convention of the America Mining Congress, was distinctly different from any other exhibit, and was one of the striking features of the display at the Coliseum.

The exhibit was unquestionably the most effective at the exposition, a central booth, circular in outline, and surmounted by a gilded beehive drew immediately attention to the Utah exhibit. Scenic views characteristic of the state and photographs projected by means of transparencies, and three balopticons gave life to the exhibit and proved very attractive. The exhibits included ores from all the principal metal mining districts, coals, metals and metallic products, hydrocarbons and hydrocarbon products, oil shales and shale products, salt, potash, building and ornamental stone, mineral earths and other mineral products.

The exhibit was installed by R. E. Head and C. C. Stevenson of Salt Lake. Miss Florence Ware, who designed the art features, personally supervised the art installation and in fact did a considerable portion of the art work in place at the exposition.

WANTED—Superintendent, by Contracting Company doing a large amount of shaft sinking in the bituminous coal fields east of Ohio river. Requirements: Man of sufficient ability to take entire charge of erecting sinking plant, rock work, and lining shaft with concrete. State age, experience and salary wanted. Address The Dravo Contracting Company, Pittsburgh, Pa.

In Nearby States

ARIZONA

The railroad to Morenci is eighteen miles long and if every curve was put together in the same direction, it would turn twenty-seven complete circles.

Charles Metcalf and associates, of Kingman, are reported to have begun active development of the Golden Hammer group of claims, near Katherine. The claims show lead ore that carries exceptionally good values in gold, it is said.

The winze recently started on the 500 level of the Tom Reed, at Oatman, is now down over 150 feet and in better ore than heretofore found on the 700 level. The ledge is wider and averages over \$12 per ton. More interesting and proven facts will be known about it when the miners resume driving along the 700 level and connect with the winze coming down from the 500. Superintendent Phelps is of the opinion that this latter work will expose one of the most important orebodies the Tom Reed has found in a long time.

The Arizona Silver Mines Co. is planning some changes in its cyanide mill at Unionville whereby it hopes to be able to increase capacity without necessitating enlargement of the power plant, said E. S. Van Dyck, president of the company, who recently passed through Reno en route home after a conference with machinery men in San Francisco. The mill is treating 25 tons per day of 23-ounce silver ore, power being supplied by direct drive gasoline engines. The company owns the old Arizona silver mine which was one of the famous producers of the old days.

BRITISH COLUMBIA

In the first nine months of 1921 the smelter of the Consolidated Mining & Smelting company of Canada at Trail, received 307,493 tons of ore, compared with 251,735 tons in the same months of 1920 and 258,323 tons in the first nine months of 1919. Most of the ore came from mines owned by the company; 7629 tons came from other mines. Shipments from Washington during the year were all from Ferry county.

Several hundred pounds of ore that carried 183 ounces of gold were shipped from the I. X. L. mine at Rossland, September 7, according to Sidney Norman, editor of Mining Truth, Spokane, Wash., who recently returned from a trip through southern British Columbia. "In this mine I picked out half a hatful of ore that was half gold," said Mr. Norman. "Eight men connected with the Consolidated Mining & Smelting Company took a three year lease on this mine. In crosscutting they struck stringers of very rich ore."

Bert N. Sharp, mining engineer and his brother, Herbert W. Sharp, mining broker, both of Spokane, Wash., are in British Columbia, where they have taken charge of development work on the Bayonne mine, west of Sheep creek, between Salmon river and Kootenia lake. The Bayonne Gold Mining Company has been reorganized with Spokane capital interested. A new camp and new bunkhouses have been completed and the company, is ready to work during the winter. Thirty tons of provisions have been sent in by pack train and more is crosscut to tap the ore body at 700-foot depth. A third shift is soon to be added.

COLORADO

Charley Fuller of Idaho Springs and Sam Thomas and Joe Flynn of Central City have secured a lease on the War Dance, one of the old time rich producers of Gilpin county.

Louis W. Vidler of Georgetown, has concluded the work for the season on the Arapahoe property in East Argentine. This week he was engaged in examining a property near Silver Plume for Denver people.

The Park Tunnel Tram Company of Aspen has closed negotiations with the American Steel and Wire Company of Trenton, N. J., for the purchase of an aerial tram complete with towers and all appliances for terminals. A guarantee is given for the delivery of the tram within thirty days.

Frank Ward of Ouray, has bonded and leased the Rock of Ages mining property from J. E. Carr and started to work the fore part of the week. Some very high-grade ore has been taken out of this property and Mr. Ward is confident there is considerably more to open up with proper development. In connection with the above property, Mr. Ward has also taken over the Pennsylvania group.

A report from Florence says: H. H. Utley, general manager of the River Smelting & Refining Co., with a branch in this city, has announced that the smelter will open and resume operations full time by the middle of November. Utley has just returned from a visit to the main offices of the company in St. Louis, where he was instructed to give out the above information. The River smelter was closed last spring, throwing about 200 men out of work.

The Ohio and Colorado smelter at Salida, recently sold by Morse Bros. to Everly M. Davis, of New York, is now being improved and repaired in readiness for operation next season, and it is understood that the plant will handle custom ore in addition to the product of the big Rawley mine in Saguache county. Morse Bros. state that the Salida smelter has a fine power house and many other modern features and is well equipped for treating silver lead ores and by-products. It is reported that Mr. Davis is a member of the Parks-Davis Drug Company and that the plant will produce drug supplies. Louis Sanders, E. M. of Grand Central Palace, N. Y., is engineer for the Davis interests.—Mt. States Mineral Age.

IDAHO

Almost nine feet of clean lead-silver ore has been cross-cut on the Puritan level and on the level 200 feet deeper in the Tamarack & Custer mines in the Coeur d'Alenes, according to reports at hand.

A carload of ore is ready to ship from the Western Union mine in the Coeur d'Alenes, according to late information. This is the first car loaded by the leasers, Kron & Johnson, since they secured a new lease. They have opened the ore body at a point 100 feet east of where they were working and the new opening is said to show ore carrying 80 per cent lead and 47 ounces of silver.

The Armstead Mines will place its mill in operation January 1 next, it was announced recently by Major H. H. Armstead, president, on his return to the property at Tal-ache. The building is almost completed and machinery for its equipment is arriving daily. Work in the mine is being pushed. The three-compartment raise has reached the 400-foot level, giving it a height of 800 feet or more above the main tunnel level. The mine will be in a con-

dition to deliver 150 tons of ore daily by the time the mill is ready to receive it. The average grade of this ore is 22 ounces of silver to the ton, he said.

Work has been commenced on a mile tunnel to be run into the Ajax Mining Company's property at Burke, to secure an additional depth of 550 feet below the bottom of the present Ajax workings. Ajax ground has been worked through the working of the Moonlight tunnel for which the Ajax had a 10-year lease.

The first silver concentrates produced in the mill of the Sunshine Mining Company, on Big creek in the Coeur d'Alene region, were recently loaded at Shonts, for shipment, according to Eugene C. Tousley, secretary-treasurer of the company. The lot consisted of 60 tons and was consigned to the Bunker Hill smelter at Bradley, five miles from Shonts and seven miles from the mine.

Several business men of Lewiston, have organized a syndicate to make a survey of the natural resources of that region, with especial references to its oil and coal possibilities. It is expected the work will require about a year for it is to cover the territory from the Salmon river country, on the south, to some distance north of Lewiston and east and west to include the Asotin district in Washington and the Nez Perce and Camas prairie in Idaho.

Moose City, the "Ghost City" of Clearwater county, which was once a prosperous little mining town of 5,000 people, had but three inhabitants when John Tibbetts, Wallace mining prospector, and his partner, left there recently. The little city is 100 miles east of Orofino. Mr. Tibbetts reported that he and his partner are confident of making a "clean up" next spring, following eight years in preparation of 2,000 feet of ditches and other work for sluicing operations.

Three mining companies are concerned in the new development program of the Silver Reef Mining Company. In order to reach lower levels in its own property the Silver Reef has entered into a contract with the National Copper Mining Company to use the lower tunnel of the Homestake Mining Company. The National controls the Homestake. By this arrangement the Silver Reef will develop its own ground and that of the Homestake and the National will be benefitted by explorations in Homestake ground. The properties are near Mullan.

MONTANA

Milling operations of the Snowstorm Mines Consolidated near Troy, have been proceeding steadily for two weeks, according to reports received at Spokane, Wash. Lead-Silver concentrates are flowing from the mill and two carloads of them left the property recently for the smelter.

Anaconda's experiments in connection with the production of a metallic shingle are arousing much interest locally and the officials are of the belief that a field has been opened up of considerable promise. This shingle is made of an alloy of copper and zinc. It is thin, durable, easily handled and is impervious to rust. It is believed that it can be made at a figure which will permit of profitable marketing. It can also be produced in different colors. Experiments are being made in the manufacture of nails and a shingle nail to go with this new product.

The Montana Morning syndicate has opened a ledge 15 feet wide at the surface. The discovery was accidental and occurred when a pile of brush was removed. Several years ago a miner offered to disclose the location of the

ledge if paid \$500. The offer was not accepted, the company having two other ledges, in one of which it was developing ore. The condition of the earth and the presence of brush over the ledge just found prompts a belief that it is the one, the miner was desirous of disclosing. The new body is 100 feet east of the No. 2 shaft and contains lead-silver ore of high-grade, according to reports. The property lies above the Snowstorm railroad, so is in a position to enjoy economical transportation.

NEVADA

The postoffice at Broken Hills was discontinued on the 15th. The business of the office had fallen off to such an extent that the service was no longer justified.

Twenty-five men are employed in preparing for extensive placer operations at Log Springs, 18 miles south of Lida, in Esmeralda county and near the California boundary.

The expected building of the railroad into and through the Contact mining district in the northern part of Elko county has aroused the liveliest sort of excitement among mining men and the recorder's office at Elko is kept busy recording the many claims sent in from that district.

A general conference of all shippers and carriers of ore in the state has been called by the public service commission of Nevada for November 4, 1921. At the conference the establishment of just and reasonable rates to cover the movement of ores to Nevada, California and Utah smelters will be under consideration.

Thomas Major, mining man of the Gold Run district, out from Golconda, has been operating mining properties in the Gold Run Basin section of the camp for a great number of years and has made numerous shipments from different properties. During the early part of this summer Mr. Major and Fred Backus installed a Gibson mill on the former's Gold Coin mine in Adelaide gulch.

The Luning Consolidated Silver Mines Company is now reported by Superintendent A. E. Lowe as in most excellent shape for continued shipments. At present one car is being mined for shipment to the plant at Richmond while another is being mined for the regular shipment to Miller's. The last car shipped to Miller's gave returns of \$35.70 a ton. The Luning Consolidated now gives promise of developing into a good shipper and long lived.

A deal was closed in Winnemucca on the 17th whereby A. R. Tobey and I. L. McGary purchased the one-half interest of Carl Stolfelt in the Reo No. 1 claim at the camp of Ten Mile. This is the property on which the strike was made in the camp and some wonderfully rich gold ore has been taken from the lead. So far only a limited amount of work has been done, but the prospects are good for opening a valuable mine there.

According to report the newly constructed mill of the Consolidated Spanish Belt Silver Mining Co. in the Barcelona district is now running steadily on dump ore after a shut-down of one week caused by a transformer burning out. Jules V. Barnd, general manager, who came out from the Toledo, Ohio, office of the company to be present when the mill started, is still at the mine. He states that 1,000 tons of dump ore will be run through before ore from the mine is milled, to assure smooth running of the plant.

The Queen of the Hills mine, situated near Hiko, in the Irish mountain district, has recently been leased by James Wheeler of Pioche. Operations have already been

commenced. The mine, which lies on the southerly slope of Mount Irish, was a famous producer in the early days, when Hiko was the county seat of Lincoln county. After passing through the hands of various owners, the mine was later acquired and patented by Mr. Greer of Alamo. Interested with Mr. Wheeler in the development of the Queen of the Hills are several other mining men of Pioche.

The Eureka Uncle Sam Mining company has closed a deal with San Francisco capitalists to furnish funds to complete five thousand lineal feet of development, which will thoroughly develop and block out ore up to the three hundred foot level. Several carloads of rail, air pipe and blasting powder is now being shipped, and modern machinery equipment will immediately be brought into operation to hasten development and to insure sufficient tonnage for continuous operation of the combination mill which will be ready by next spring.

Development of the Ely Northern mine by the Boston-Ely company is going on in a manner pleasing to S. Herbert Williams, manager of the company, and W. H. Boyle, superintendent. The Ely Northern group is on the north side of the canyon about a mile and a half west of Ely and the ore at present being taken out averages from 5 to 8 per cent copper content. There are at present about 1,600 tons of this grade of ore on the dump and higher values are looked for as development progresses, which will be carried on in an extensive manner.

C. K. Jarvis left Reno several days ago for Rebel Creek, Humboldt county, to take out a shipment of ore for the Cottontail Mining Co., in which he is interested. The company is developing a gold property which it holds under a bond and lease, on which the second payment has been made. J. J. Burk of Reno is president of the company, R. M. Preston, vice-president and A. Hankammer secretary and treasurer. Jarvis secured the lease and option to purchase four months ago. Ore of shipping and milling grade has been opened in two tunnels 490 feet apart on the same vein. The shipping ore is sorted to \$100 per ton.

WASHINGTON

More activity is being shown in the mining industry in the Oroville district this fall than has existed during the last 10 years, according to Horace B. Smalley, who is interested in the Rainbow group, located 12 miles west of Oroville. "I estimate that about 150 miners are now employed in the mines around Oroville," said Mr. Smalley. "The properties operating are all silver-lead, carrying high values in silver. Most of the mines are shipping to the Tacoma smelter."

The United Silver-Copper company, operating near Chewelah, has followed high-grade silver-copper ore for 65 feet on the 1400-foot level, according to E. A. Wolfle, manager. Also it has followed ore of the same grade in a winze sunk 25 feet below this level. "The high-grade streak is a foot to two feet wide and contains an average of 70 ounces of silver to the ton and 11 per cent copper," said Mr. Wolfle. "Some of the silver values run up to \$300 to the ton."

"I'm sorry to have to do this," said little Johnny, as he spread the jam on the baby's face, "but I can't have suspicion pointing its finger at me."

Some rock crystals have as many as 300 different sides.

Petroleum Notes

C. H. Brown, formerly with the sales department of the Continental Oil Co., has been appointed sales manager for the Arro Oil & Refining Co., which is placing its refinery at Lewistown, Mont., in operation.

Good & Nutting, of Rawlins, Wyoming, have a rig up on 480 acres on Mahoney Dome, on sec. 1-25-88, and also on sec. 3-26-90. This firm recently secured considerable acreage in the Lost Soldier, Mahoney Dome and Ferris districts.

Renewed activities in the Producers and Refiners camp in the Ferris field, Wyoming, are in evidence since the announcement of the new 85 mile pipe line to serve that section. Several additional oil or gas wells are about ready to be brought in.

It is reported that the Western States Oil & Land Co. will drill an offset at once to the Union Oil Co.'s new well in the Lance Creek field, Wyoming. Other interests will also probably drill in the same locality. The Union's well is making 75 bbls. a day from a depth of 2,900 feet.

W. R. Calvert, geologist, and E. H. Watson, field representative, of the Utah Oil Refining company, a subsidiary of the Standard Oil, were arrivals Friday, and are spending some time in this vicinity, making an investigation of the Moab structure and the Big Six and Shafer domes down the Colorado river, says the Moab Times Independent.

Casper, Wyoming, dispatch, 26th: The Fargo Oil Company, which was financed largely by Salt Lake and Ogden investors has brought in a well flowing 20,000,000 cubic feet of gas a day. One of the most important tests and one which it is believed will add a considerable area to the proven districts of Wyoming, will soon be under way in the Pine Mountain field, about twenty-five miles southwest of this city.

Drilling operations of the Fowler Oil company are to be resumed within a few days, according to M. C. Godbe, director of the company. Finances necessary for a resumption of this work have been secured, says Mr. Godbe, and work will be resumed as soon as possible. The well of the Fowler Oil Company, which is situated on the Fowler dome near Conrad, Mont., on the Great Northern railroad, had reached a depth of 1,270 feet when operations were suspended. Not more than 500 feet of drilling should be necessary to reach the Quadrant sands, the objective of the well, according to Mr. Godbe.

PITTSBURG TRAMWAY UNDER CONSTRUCTION

The equipment for the building of the Pittsburg mine tramway in American Fork Canyon has been hauled to the place where operations are to begin, according to W. K. Yorston, who is superintending operations. Fourteen thousand feet of cable and 8,000 feet of haulage rope, says Mr. Yorston, have been hauled to the site of the tramway terminal on the floor of the canyon at a point about twenty miles from American Fork. Work of constructing the tramway towers has already been begun. Within a week from forty to fifty men will be engaged in the work of constructing the tramway. If favorable weather continues Mr. Yorston expects to have the tramway constructed by the first week of November.

Around the State

Directors of the Sells Mining Company have called a special stockholders' meeting for November 17 to consider the advisability of increasing the capitalization of the company from 600,000 to 1,000,000 shares and at the same time reducing the par value of the stock from 25 cents to 15 cents.

There are large areas of mining ground being located in the eastern part of this district in the vicinity of the Park-Utah. Scores of location notices have been secured from this office by local mining men the past two weeks, who predict great things for that section within the next year or two.—Park Record.

At the Boan Gilsonite mine, about one and a half miles from Duchesne, men are busy digging the black gilsonite to fill an order received from New York. Two carloads are wanted. It will have to be hauled by trucks to the railroad. At the Gilsonite mine, on Leland bench, near Ouray, men are at work digging out two more carloads of the material to be shipped to New York.

Coal from the Straight canyon coal mines is now being moved over the Ephraim-Orangeville, Utah, highway, the first load arriving at Ephraim the past week, according to advices received at the capitol. It was thought at first that the grade was too heavy to be negotiated with a load of coal, but it has been demonstrated that three tons can be moved over the road with a four-horse team.

A contract has been let for the sinking of the Zuma shaft to R. D. and Soren Runnells of Eureka, by P. J. Fennell, who reserves the right to annul the contract at any time after the shaft has been sunk an additional 100 feet. Mr. Fennell says he believes that a large vein of ore will be encountered within the next few days. The contract was let for \$13.50 per foot, the contractors to furnish the powder.

E. M. Rogers, of New York, and Charles E. Anderson, of Aspen, Colorado, arrived in Park City yesterday, and today, in company with Clarence Bamberger and N. A. Dunyon, drove up to the Ontario to visit and inspect that famous old producer. Messrs. Rogers and Anderson are mining engineers of more than local reputation. The gentlemen will likely visit other Bamberger properties while in this city.—Park Record.

The lime quarry of the Chief Consolidated Mining Company at Eureka is fast nearing the productive stage and the company should be getting out a good tonnage of lime rock in a few days. When the Chief Consolidated company found that quarrying on this part of its tract was feasible it was decided to put a special product on the market. Accordingly contracts were closed with the smelters for a clean screened lime of a size from 1 inch to 2½ inches in diameter. Contracts with sugar companies calling for a clean product varying in size from 2½ inches to 6 inches were also secured. Lime rock, cleaned and sized to meet special requirements has never been supplied by quarries in the state. Up to the present time it has been necessary for the smelters and sugar companies to install equipment to put the lime rock in condition for its various uses.

Organization of the South Hecla Mines company, by the Watson and the Knight interests, last week, is considered by Alta mining men to be a step of considerable im-

portance. By the acquisition of the properties and the property interests of the Alta Utah Mines and the South Hecla, the Albion Consolidated, and the South Hecla Extension Mining companies a total of 1,300 acres on the south side of the Alta district reaching over into American Fork is secured. The new company is capitalized at \$500,000 divided into 5,000,000 shares of equal value. Of this capitalization, 1,999,000 shares have been issued in payment for the property and the property interests now owned by the company, according to George H. Watson, president of the new organization. The remainder, 3,001,000 shares, he says, will be placed in the treasury for financing purposes.

Construction Notes

According to Pocatello, Idaho advices, the Fort Hall Irrigation project is preparing to spend \$770,000 on betterments.

Another bit of Idaho news is that \$1,458,600 is to be spent on construction of the Hill Crest extension of the Payette-Boise irrigation project.

Smithfield, Cache county, Utah, negotiated the sale of \$35,000 worth of water bonds. The Palmer Bond & Mortgage Co., of Salt Lake, were the successful bidders for the bonds.

The management of the Con-Virginia Mining Co. at Virginia City, Nevada, is said to be considering plans for the enlargement of the Mexican mill, now running exclusively on ore from that mine. The present capacity is from 125 to 150 tons per day.

O. Sumpter of Salt Lake, with offices in the Kearns building, has applied to the state engineer for the diversion of eighty second feet of water from Blacksmith Fork of the Logan river for the purpose of generating electric power, which he proposes to furnish to Utah and Idaho points.

A Pocatello, Idaho, dispatch of the 14th says: Two new sewerage districts, No. 13 and No. 14, were created by the city council at an adjourned meeting last night, under suspension of rules. Final action on the purchase of a flusher and sprinkler for the streets was deferred until the middle of next January. The city engineer was given authority to buy a tractor for use on the streets.

Ground has been broken at Lincoln avenue and Twenty-eighth street, Ogden, Utah, for the St. Joseph's parochial school, which, when completed, will cost \$250,000. The first unit will be built at a cost of \$75,000. It will be 105 feet by ninety feet, two stories, with full basement. Fireproof construction is to be used throughout the building, which is to be of steel, concrete and brick. Plans for the structure have been completed by Eber F. Piers of Ogden, who is also preparing plans for St. Mark's hospital. After the completion of the excavation for the foundation bids for the construction for the upper part of the building will be asked. It is expected the work will be well under way before the first of the year.

Women used to swap recipes. Now it's the men.

If you cannot honestly obtain all you want, you have an easy remedy—do not want so much.

Personal Mention

H. E. Clement, E. M., was in central Idaho on professional business for a few days during the month.

D. E. Moore, a well known old-time mining man of Salt Lake, died at Ocean Park, California, September 11th.

David W. Brunton, so well known in mining circles throughout the west, recently motored from Denver to San Francisco, and now is on the last leg of the return trip.

J. C. Dick, Salt Lake mining engineer, was made chairman of the resolutions committee of the American Mining Congress at its annual session in Chicago last week.

Charles R. Miller, president of the Tonopah Mining Co., returned to his home in Wilmington, Delaware during the month, after spending several days at the company's mines.

C. W. Stimson, president and general manager of the Stimson Equipment Co., has gone to Honolulu for the purpose "resting up" for a time. His multitude of friends expect to see him much improved in health on his return.

The Byron Jackson Iron Works branch offices of Salt Lake have been moved from the American building to 132 West Second South street. Stanley Stevens is the local representative of this company.

E. M. Greenleaf, manager of the Salt Lake branch of the Allis-Chalmers Manufacturing Co., has been assigned to the Los Angeles house, while A. H. Wyman has been transferred from Los Angeles to Salt Lake to take Mr. Greenleaf's place.

M. L. Cunningham, for a number of years a member of the editorial staff of the old Salt Lake Herald in the heyday of its career, and who now is a member of the editorial force of the Boise Statesman, has been visiting in Salt Lake during the month. Mr. Cunningham was accompanied by his wife.

Walter J. Eaton, for the past four years with the American Metal Company interests in Mexico, has resigned as superintendent of the Naica and Santa Eulalia units of the Cia Minera de Penoles, S. A., to accept the position of mine superintendent at the Smuggler-Union, at Telluride, Colorado.

D. States, superintendent of the Eureka-Uncle Sam properties at Eureka, Nevada, was in Salt Lake about the middle of the month purchasing a compressor and other machinery for his company. He predicts a great future for the old Nevada camp in which he has made his home for many years.

Solon Spiro, president of the Silver King Consolidated Mining Company, since his return from an extended stay in the east, has been giving particular attention to the local affairs of his company. He is much impressed with the manner in which the mine is responding to development and declares utmost faith in the property's future—a faith that has never deserted him for a moment. Mr. Spiro is greatly improved in health.

A. J. Canavan, better known as "Andy," superintendent of the Nevada Protective Mining & Investment Company was in Reno for a few days last week. Mr. Canavan is one of the old time Goldfield superintendents, who was in charge of properties there in the days of high-grade. He was superintendent of the Goldfield Consolidated, having held several quite as responsible positions previously.

E. Katsumata, chief engineer of the Mitsubishi Mining Company, coal operators of Tokio, Japan, completed a visit to the coal fields of Utah during the latter portion of the month to study the use of Sullivan coal-cutters, this type being installed in the Japanese mines at this time. During his visit to this country Mr. Katsumata also took in the coal fields of Pennsylvania, West Virginia, Illinois and Indiana. He will sail from Portland for home in a day or two.

FOUNDARY AND MACHINE CONCERNS MERGE

By a merger of the Stearns-Roger Mfg. Co., the Denver Engineering Works, the Colorado Iron Works, and the Queen City Foundry, all of Denver, the General Iron Works Company has been organized with a capitalization of \$1,000,000. The deal is said to have been effected by the management of the Stearns-Roger company whose Pueblo plant was damaged by the June flood.

Officers of General Iron Works are: Thos. B. Stearns, of Stearns-Roger, president; T. A. Dickson, of the Colorado Iron Works, vice-president; Frank E. Shephard, of the Denver Engineering Works, second vice-president; Alfred Cardingly, of the Queen City Foundry, third vice-president; R. W. Gordon, treasurer; C. L. Dean, secretary. Other members of the board of directors are, A. B. Kennedy and J. R. Henderson.

The Colorado Iron Works plant at Thirty-third and Blake Sts., Denver, will be enlarged at a cost of \$500,000, and should become one of the largest between Chicago and San Francisco. The Queen City foundry will continue for the present to operate its railway castings department. In addition to mining machinery, the new concern will produce sugar plant equipment and other machinery of all classes.—Mt. States Mineral Age, Denver.

NEW BOOKS RECEIVED

First Aid and Rescue Work in Mining, by Louis G. Irvine, M.A., M. D., B. Sc. Published by the South African Red Cross Society, Johannesburg. Mining & Scientific Press, San Francisco, American distributors. Flexible cloth binding, 4¾x7 in., 350 pages, highly illustrated. Price, \$2. For sale by the Salt Lake Mining Review.

This handy-sized volume describes in part one a most comprehensive general course in first aid, while part two deals particularly with first aid and rescue work in mining. While the author lays no claim to exclusiveness of methods described in the practice and application of first aid devices, as generally employed and described in works of this character, he does claim to have so simplified and correlated the information contained in this volume, that students in such training, and even those who wish to become informed, but who have no opportunity for systematic training, can grasp the ideas illuminated and easily become sufficiently expert so that, in cases of danger and accident, valuable service can be rendered in times of need. Great pains have been taken to illustrate innumerable characters of accidents that require prompt action and a knowledge of anatomy if first aid is to be of genuine value. The application of bandages under all conceivable conditions and the immediate care and handling of the injured, are features alone which are worth more than the book costs.

Approximately 260,000 silver dollars are being made daily at the San Francisco mint under recent instructions to speed up production, according to Superintendent M. J. Kelly.

COPPER PRODUCTS FROM PLANT AT AJO EXHIBITED IN BISBEE

A display of copper articles recently fabricated experimentally at the plant of the New Cornelia Copper Company at Ajo has been installed in the show windows of the Phelps Dodge store at Lowell, says the Arizona Mining Journal.

In connection with the display a notice is posted to the effect that "The Calumet & Arizona Mining Company offers a prize of \$50 cash for the best suggestion for either increasing the uses of copper or the manufacture of some specific article that will accomplish the same purpose."

The display at Lowell consists of auto and house radiators manufactured electrolytically from the solution at Ajo; copper road signs, made of copper plate with the perforated lettering; sheet copper, some master phonograph records and other small copper articles, all but a few of which were manufactured at Ajo.

Fabrication of copper articles by the new electric system that has been evolved at Ajo is still in the experimental stage, but may become of tremendous importance to the copper industry. It is because of the public interest in the work that is being done there that the display is made, and the prize contest has been started in connection with it in the hope that somebody may make a worth while suggestion that may be used in promoting the use of copper.

PIPE LINE MAY AID ZINC MINES

The Ohio Oil company will construct a pipe line from the Elk Basin gas field, in Wyoming, to Billings, a distance of seventy-two miles. This line will be connected with one well which is producing daily 100,000,000 cubic feet of gas. It will require three months to build the line, costing about \$120,000 and affording employment for 500 men. The bringing of natural gas to Billings, in the opinion of metallurgical circles, may open up possibilities of the treatment of zinc ores at Billings. Natural gas is essential in the reduction of zinc in view of its greatly reduced cost as compared with coal, and aside from the electrolytic treatment of zinc ores at the Anaconda plant at Great Falls, Mont., it has been necessary to ship zinc concentrates to Bartlesville, Okla., and to Caney and Deering, Kan. Surveys of the line have been made, and construction will begin shortly.

PROPAGANDA, OR SOMETHING BIG GOING ON

A leading Wyoming daily newspaper in August published an article dealing with a contest said to be getting under way between Royal Dutch interests and Standard Oil companies for supremacy in the Wyoming fields. General Petroleum, Producers & Refiners and one or two others were mentioned as being goals in the game. This was recently followed by another article in a Salt Lake paper saying Utah would be a battle ground for one of the biggest oil fights ever waged in the United States, if there is any foundation for reports floating around that city. It mentioned plans for Royal Dutch interests to build a refinery in that city, to buy crude in Wyoming, including Salt Creek, and do a few other interesting stunts. Western Pipe Line Co., which has a projected line from Salt Creek to Casper, was mentioned as one of the connecting links. Next came a Montana paper telling about Royal Dutch interests working under cover, getting production under contracts in Cat Creek and probably backing some of the small refineries which have sprung up in that state and made valuable

contracts. It also told of contracts being made in north-western Wyoming.

These articles, apparently, are in no way connected with each other, though they are clothed with the color of propaganda. Merger of Union Oil Co. of Delaware, with the Shell Co.; a fund of \$400,000,000 deposited in American banks by Royal Dutch to buy oil properties; retaliation against Standard Oil for invading Royal Dutch territory in foreign countries; recent depression of crude prices to force independents to sell to Standard Oil, are some of the things credited to this alleged contest by papers in other parts of the country.

Whatever there may be to it all, the fact remains that Royal Dutch interests have been reported upon the best of authority as having acquired several hundreds of thousands of acres of prospective oil lands in Wyoming, Colorado, Montana and Utah. The wells drilled by them can, however, be counted on one hand. In some instances these lands have been turned over to other companies under some kind of agreement and on more than one occasion the second companies have turned them over to third interests. The result is that it is very doubtful if anybody in this territory really knows just what the Royal Dutch interests are doing though there are a variety of opinions.—Wyoming Oil News, Oct. 15.

NEW MEXICAN ENGINEERS ORGANIZE

Las Cruces, N. M., Oct. 22.—Las Cruces chapter of the Southwestern Division, American Association of Engineers, was formally organized on the 14th with twenty-five members and the following named officers:

Past president, Professor R. W. Goddard, dean of engineering, New Mexico College of Agriculture and Mechanic Arts.

President, Professor D. S. Robbins, instructor in mathematics, New Mexico College of Agriculture and Mechanic Arts.

Vice president, E. L. Bandy, district engineer for the State Highway Commission.

Secretary-treasurer, Herbert Yeo, surveyor for Dona Ana county.

Executive committee, the foregoing officers and C. M. Ainsworth, drainage construction engineer of the U. S. Reclamation Service.

The membership committee, composed of the executive officers, headed by Mr. Yeo, will make a drive to enroll all the engineers employed in this district.

Professor Goddard presided at the organization meeting.

GERMS PASS THROUGH CISTERN FILTERS

Cistern water that is used for drinking should be gathered with great care. Properly constructed cisterns that receive rain water from roofs generally afford good drinking water, but water of doubtful quality that is stored in cisterns is of course not safe for domestic use. According to the United States Geological Survey, Department of the Interior, most of the filters that are used in connection with cisterns do not remove the germs of disease, though they may make the water clear and apparently safe. Many cisterns are divided into two compartments by a brick wall, the water being admitted into one compartment and pumped or drawn from the other after it has passed through the wall. The passage of the water through the brick improves it in clearness and color but not generally in sanitary quality.

SALT LAKE MINING STOCK QUOTATIONS

The range of the market from October 13th, 1921, through October 24th, inclusive. Quotations furnished by J. A. Hogle & Co., direct wires to all leading markets, 169 So. Main St., Salt Lake City, Utah, and ground floor of Eccles Building, Ogden, Utah.

CLOSING								CLOSING							
Stock.	Open.	High.	Low.	L. S.	Bid.	Asked.	Sales.	Stock.	Open.	High.	Low.	L. S.	Bid.	Asked.	Sales.
Alta Mich.								Keystone							1.00
Antelope Star							2,000	Kennebec							.05
Alta Con.						.01		Lehi Tin.	.01	.01	.01	.01		.01	5,625
Alta Tiger							1,500	Leonora	.03	.03	.02	.02		.02	11,500
Am. Con. Mns.	.01	.01	.01	.01	.01	.02	4,000	Logger	.01	.01	.01	.01		.01	500
Albion Cons.	.06	.06	.06	.06	.06	.09	10,700	Lynn Big Six	.06	.06	.04	.05		.04	3,000
Alta Tun.	.11	.13	.11	.11	.11	.12	48,000	May Day						.01	.02
Bullion						.02		Michigan-Ut.	.07	.08	.05	.05		.05	61,000
Big Hill	.02	.02	.02	.02		.03	2,000	New Quincy	.07	.09	.07	.08		.08	39,925
Big Cot. Coal.						.04		Naildriver						.10	.20
Beaver Cop.	.01	.01	.01	.01		.01	10,000	No. Standard	.02	.02	.02	.02		.02	6,000
Bay State						.02		Ophongo							
Black Metal	.06	.06	.06	.06		.06	1,000	Plutus						.10	.20
Bingham Gal.	.07	.07	.06	.07		.07	21,000	Prince Con.	.07	.07	.07	.07		.06	6,500
Cent. Eureka						.02		Pioche Bristol		.01				.01	9,500
Cedar Talis						.02		Price Mining	.02	.03	.02	.03		.03	11,500
Colb Rexall	.16	.16	.14	.14		.14	2,900	Provo	.02	.02	.02	.02		.02	1,000
Colorado Con.	.02	.02	.02	.02		.01	2,200	Reeds Pk.Cons.	.01	.01	.01	.01		.02	500
Crown Point						.02		So. Standard	.12	.12	.12	.12		.12	500
Cardiff	1.05	1.05	1.02	1.05	1.02	1.15	400	Sells	.03	.03	.02	.02		.02	17,500
Croff								Syndicate							7,000
Daly						1.25	2.75	Sil. King Coal.	2.00	2.27	1.97	2.10	2.05	2.15	3,200
Daly West						2.00	2.50	Sil. King Con.	.51	.58	.51	.56	.62	.69	3,665
Dragon						.03	.06	Sioux Mns.	.01	.01	.01	.01		.01	3,000
Emma Silver							31,000	So. Hecla						.30	.40
Empire Mns.						.02		Silver Shield	.06	.06	.06	.06		.05	6,000
Eastern Prince								Tar Baby	.03	.04	.03	.04		.03	66,000
Emerald	.01	.01	.01	.01		.01	1,000	Tin Central	.01	.01	.01	.01		.01	3,000
Eureka Mns.	.04	.04	.04	.04		.03	3,500	Tin Standard	1.92	1.92	1.87	1.87	1.85	1.90	8,350
E. Crown Pt.	.02	.03	.02	.02		.02	14,000	Uncle Sam							.01
E. Tin Coal						.01	3,000	Utah Con.							
E. Tin Con.						.06		Union Chief						.02	.05
E. Antelope								Victor Con.							
Eureka Lily	.09	.09	.09	.09		.09	7,000	Victor Mng.	.02	.02	.01	.02		.02	2,500
Eureka Bullion	.04	.05	.04	.04		.04	15,500	Whirlwind							
Gold Chain	.06	.06	.06	.06		.04	500	West Toledo	.03	.03	.02	.03		.02	5,000
Hamburg Mns.						.07	9,363	Walker Mng.	2.52	2.80	2.52	2.80	2.50	2.80	1,100
Howell	.06	.06	.06	.06		.06		Woodlawn	.07	.07	.07	.07		.07	1,000
Iron Blossom	.15	.15	.15	.15		.15	500	Yankee Con.	.01	.01	.01	.01		.01	3,000
Iron King	.07	.07	.07	.07		.06	900	Zuma	.03	.06	.03	.05		.03	4,500
Judge M. S.						2.00	3.00								

ASSESSMENTS PENDING

Globe Consolidated Mining company, $\frac{1}{2}$ c a share. Delinquent November 14. Sale day December 5.
 Gold Springs Mining company, $\frac{1}{2}$ c. a share. Delinquent November 14. Sale day November 30.
 Little May Mining company, $\frac{1}{2}$ c. a share. Delinquent November 22. Sale day December 12.
 Eureka Bullion, $\frac{1}{2}$ c. a share. Delinquent November 5. Sale day November 23.
 Tar Baby, $\frac{1}{2}$ c. a share. Delinquent November 2. Sale day December 2.
 Alta Star, $\frac{1}{2}$ c. a share. Delinquent November 2. Sale day November 23.
 Lehi Tintic, 1c. a share. Delinquent November 12. Sale day December 10.
 Michigan-Utah, $\frac{1}{2}$ c. a share. Delinquent November 21. Sale day December 12.
 North Standard, 1c. a share. Delinquent November 21. Sale day December 15.

ORE SHIPMENTS

For the two-week period ending on the 21st ore shipments from the Park City district totaled 4,076 tons, represented by three shipments, (though the output of the Judge Allied companies represents three or four mines, the control of which are held by the Judge Mining & Smelting company), as follows:

Judge Allied companies	1,890
Ontario Silver Mines Company	748
Silver King Coalition	1,438
Total tons	4,076

During the two-week period ending on the 21st seventeen mines of the Tintic district, which report output in carloads rather than tons, shipped to the valley smelters and mills a total of 315 carloads, aggregating 15,750 tons, as follows:

Tintic Standard	131
Chief Consolidated	79
Victoria	18
Eagle & Blue Bell	15
Iron King	16
Iron Blossom	14
Dragon Consolidated	4
Swansea Consolidated	8
Centennial-Eureka	6
Bullion-Beck	5
Sunbeam	4
Grand Central	6
Colorado Consolidated	3
Alaska	1
Eureka Mines	1
Gemini	2
Empire Mines	2
Total carloads	315

JIGGING BULLETS FROM TARGET RANGE

F. H. Lamley, an ore specialist, is removing lead and copper-nickel from the hill back of the target range at Camp Lewis, near Tacoma, Wash. By means of a "jig" operated by water power, he shakes the heavy metal from the earth which he is excavating. In three months' time he expects to get 100 tons of metal valued approximately at \$200 a ton, and having cleaned up at Camp Lewis, he will take his apparatus to other camp sites. All of the metal he mines was shot into the hillside by the boys of Uncle Sam's army two years ago. Lamley works on a commission basis. "First to mine a target range," says Lamley of himself.—Exchange.

METAL MARKET QUOTATIONS, OCTOBER 24

Silver	99 $\frac{1}{2}$ c.
Silver (in London)	40 $\frac{1}{2}$ d.
Copper	13 $\frac{1}{2}$ @13 $\frac{1}{2}$ c.
Lead	\$4.70@4.75
Zinc	\$4.70

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The Salt Lake Mining Review

VOL. 23 NO. 15

SALT LAKE CITY, UTAH, NOVEMBER, 15 1921

SINGLE COPIES, 15 CENTS

New \$25,000,000 Steel-Iron-Coal Merger Formed by Powerful Utah-California Interests

According to a San Francisco story, contained in a special dispatch to the Salt Lake Tribune of yesterday, a gigantic coal, iron and steel merger has been effected on the coast during the past few days. The new corporation—in fact the entire proposition—has been whipped into form by L. F. Rains, the well known Salt Lake coal operator, president of the Carbon Fuel Co. and other Utah coal mining enterprises. According to the report he has been joined by W. E. Creed, of San Francisco, president of the Pacific Gas & Electric Co., and a powerful combination of other California and Utah coal, iron, steel and financial interests. The story, as it comes from the coast, is given as follows:

Into this mammoth financial and business amalgamation have been drawn the Utah Coal & Coke company of Sunnyside, Utah; the Columbia Iron & Steel company, with plants at Pittsburg, Cal., and Portland, Ore., the Southern California Steel company of Los Angeles and several rich iron properties in the Iron Springs mining district in Iron county, Utah.

Purposes of Combine Enumerated.

Included in the plans formulated by those effecting the merger are these enormous projects:

Construction of a 500-ton blast furnace.

Construction of a large by-products coke plant.

Development of the Utah Coke & Coal company's properties.

Building of a railroad from the Denver & Rio Grande Western Sunnyside branch to the properties, a distance of four and six-tenths miles.

Development of the rich iron deposits in Iron county, Utah.

Construction of twenty-five miles of railroad from the station of Lund on the Los Angeles and Salt Lake route to connect the iron deposits with the main line of the railroad.

Taking over of several large limestone deposits near Salt Lake.

Further development of the three plants of the Columbia Steel company and the Southern California Steel company.

Development of a large steel plant at or near Salt Lake.

Salt Lake to Be Operating Center.

The blast furnace and steel plant will be located probably on Utah Lake.

Behind this announced program of construction and development lies a plan calculated to open the west, from Salt Lake to the Pacific, to an era of unprecedented business and industrial prosperity.

In a word, in the rich and undeveloped iron deposits of Utah there are calculated to be 300,000,000 tons of iron ore in the Iron Springs district alone which are to be

transformed into iron and steel and manufactured into products of every description for sale and use on the Pacific slope and adjacent states of the west.

And from this will follow, in the opinion of those behind the gigantic project, an era of new industries in the west; new manufactories using the iron and steel products manufactured for the first time from pig iron produced in the west.

How great will be the resultant commercial development, growth of trade, expansion of industries, employment of skilled labor and increased population is more than the men of big business behind this latest project can presage.

Undertaking Developed by L. F. Rains.

The father of the project is a Salt Lake man, L. F. Rains, president of the Carbon Fuel company and other corporations of Salt Lake.

Several years ago Mr. Rains conceived the idea of a merger that would make possible laying open the rich iron deposits of Utah and the development of iron and steel product manufacturing in the west. He set to work, alone at first. Two years ago his work became intensive. He consulted others and laid out his plans. Little by little he saw the idea grow and develop.

A week or so ago he came to San Francisco to conclude the deal with his associates. There were conferences each day at which the myriad of details incident to the plan were considered and discussed by experts. Yesterday all obstacles were swept aside and Mr. Rains, his dream fulfilled, sat modestly in the lobby of the Bellevue hotel to unfold exclusively to a Tribune correspondent every detail of this enormous undertaking.

Rains explained with the understanding of an expert how the coking coal properties in Utah, controlled by the Utah Coke & Coal company, will supply the coke and coal for the great iron and steel plants of the new Pittsburg.

He pictured the great undeveloped iron ore deposits of Utah, how they have lain dormant like buried pots of gold, and how Pacific coast iron and steel mills have had to rely on scrap iron for iron and steel products manufacturing.

This, he declared, had led to extremely limited production of iron and steel products on the Pacific coast, making it necessary for western industry to draw on the east for these necessities.

One hundred and fifty million dollars, Mr. Rains said, are sent to the east each year by Pacific coast industries for iron and steel products that are manufactured in the east and sent to the west for industrial purposes.

"Not only will that \$150,000,000 be kept in the west hereafter," said Mr. Rains, "but with the manufacture of iron and steel products here in the west it will be possible

to supply western industry with its products cheaper, for the cost of transcontinental freight rates will have been eradicated.

"Picture the growth of industry that is destined to follow the coming of new industries—the greater circulation of money in the west, increased employment and commercial development. The opportunities are without limit and beyond conjecture."

Properties Going Into Merger Worth \$10,000,000.

As a still greater golden dream, Mr. Rains sees the deposits extending over the Pacific coast from British Columbia to Mexico—deposits which have remained for centuries under earth through the lack of coking coal to make possible the extraction of the raw product.

Mr. Rains' idea, fundamentally, was simple. He knew the need for coking coal to develop the raw product from iron ore. He realized that virtually all iron manufacturers were drawing on these deposits to meet their pig iron necessities. He saw the few iron and steel mills on the Pacific Coast obliged to use scrap iron because no one had taken the trouble to bring together the coking coal deposits and the iron ores of Utah. That, in a word, sums up the meaning of his gigantic undertaking.

Mr. Rains estimates that the value of the plants and properties drawn into the merger is \$10,000,000. The remaining \$15,000,000 represented in the \$25,000,000 capital investment in the amalgamation will be spent in development work in Utah and California, he said. All details of the merger have practically been worked out, according to Mr. Rains, and it remains now only for the concluding of technical phases of the project and the legal ends.

It has not yet been decided whether the new corporation will be incorporated under the laws of Utah or of California. The \$25,000,000 merger as yet is unnamed.

W. E. Creed of San Francisco, president of the Pacific Gas & Electric Company and the Columbia Iron & Steel company, one of the financiers in the merger, will be president of the corporation. Mr. Rains will be one of the vice presidents. The full list of officers has not yet been chosen.

Eminent Men Concerned in Big Enterprise.

Mr. Rains's associates in the project are as follows: From Utah:

A. C. Ellis, Jr., attorney and president of the Utah Gas and Coal company.

W. W. Armstrong, president of the National Copper Bank.

Duncan MacVichie.

Captain E. J. Raddatz, president of the Tintic Standard Mining company.

From southern California:

A. C. Denman, Jr., president of the Southern California Iron & Steel company.

William R. Staats, Russel McD. Taylor, S. K. Rindge, A. W. Grier, E. G. Pratt and C. G. Henderberg.

From San Francisco:

W. E. Creed, Joseph Sloss, J. D. Grant, D. H. Botchford, A. E. Boynton, W. C. Hammond and Herbert Fleishacker.

Regarding the blast furnace to be constructed at Salt Lake, Mr. Rains stressed the point that it will be only a beginner and that the construction of additional furnaces of similar or greater size may follow.

One feature of the project is that the plants and corporations amalgamated will lose their individual identity and will become constituent units in the corporation.

Mr. Rains announced last night that the Harriman

railroad system will give rates from Utah east to Kansas City, Mo., and Council Bluffs, Iowa, on iron and steel products.

"From that you can see," he explained, illustrating his statement on a map of the United States, "that our corporation will cover a territory stretching from Seattle to San Diego and eastward through Utah to Kansas City and Council Bluffs.

"There will be shipped from Utah to the Portland, Los Angeles and Pittsburg, Cal., plants pig iron, steel billets and blooms manufactured from iron deposits of the Utah fields. As units in the one great system these plants will fabricate the steel and turn out the products. The whole system will work with the union of one great smooth-running machine."

Coking Coal Supply Extensive.

Mr. Rains declared that there are 90,000,000 tons of coking coal in the properties of the Utah Coke & Coal company, the seams being seventeen feet in thickness.

Here is Mr. Rains's summary of the big project as made tonight to The Tribune correspondent:

"The enterprise is so connected in the scope of its operation that I cannot understand why it has not been put into effect before. Coke and coal are essentials in producing pig iron. The west's greatest coking coal deposits are in Utah. All the western steel plants should have drawn on these deposits for their manufacturing purposes. Pacific coast mills have not been using pig iron in manufacturing their products of iron and steel, for they never have had access to coking coal. They have confined their operations to manufacturing from scrap iron. This has meant extremely limited production, so limited, in fact, that each year there are brought into the Pacific coast from the east steel and iron products, including manufacturing equipment, machinery, building materials and the like aggregating \$150,000,000.

"Now we will dig the iron ore deposits from the bowels of the earth in Utah, send them to Utah plants for transformation into iron and steel products with the use of Utah coke and coal. That means that millions which have heretofore gone east annually will stay in the west. It means more business, more money, more industries, more employment, more prosperity. And it means nothing less than that Utah will become the Pittsburg of the great golden west."

UTAH PIONEER MINING MAN DIES.

William Hatfield, for fifty-seven years a resident of Utah, died at the home of a daughter on the 31st ultimo and was buried on the 3rd instant by the Masonic fraternity, interment being at Springville, Utah. Mr. Hatfield was 73 years old and was known throughout the mining west. He came to Utah when 16 years old and most of his life was spent in the mining business. He was the man who struck ore in the Bullion Beck mine and he also discovered the Swansea mine. Mr. Hatfield was one of the pioneers of the Tintic district. For many years he lived in Eureka, where he operated the Snowflake mine and engaged in the hotel business. He was also connected with mining at Alta.

Just at a time when copper seems to be a drug on the market the ore is being discovered in the most unlikely places. The latest strike is in the Shetland Islands, whose chief production up to now has been ponies. A London syndicate has acquired the rights over an area of ten square miles; engineers are laying down a plant, and mining is to start this month.

RESEARCH WORK EXPERTS CHARGED WITH EFFORTS TO RETARD SHALE INDUSTRY

By L. G. SCHWALENBERG.

De Beque, Colo., Nov. 12.—Judging from the report of one man interested in the development of the shale oil industry who attended the recent sessions of the American Mining Congress and the conference of shale men in Chicago, while De Beque and some other places with oil shale resources received a little additional publicity, no real good for the industry was accomplished. As the engineer who received the report from a personal friend said:

"They had a little discussion that brought out no information of any practical value; did some resolving; appointed a few committees that will exist only on the minutes, and listened to a paper by a technical expounder who led them into a labyrinth of technical processes and left them there to extricate themselves—if such a thing were possible. Such things only create the impression in the minds of the public that the shale men are getting nowhere and have little chance of getting anywhere for a long time to come."

As a matter of fact, more "bunk" regarding oil shales and shale oil is being put out by technical spielers—super-technical and ultra-scientific—than by salesmen handling shares of wildcat oil companies. These individuals try to create the impression that not until they can have the time to do the "tremendous amount of chemical research work" which they claim will be necessary before commercial products can be obtained from shale, can the shale oil industry hope to make any progress. Like the amateurs trying to prove their theories concerning the adaptation of the flotation process to extraction of metallic values from various classes of ores, they will still be experimenting in chemical research long after the practical-technical men have put the production of oils from shales on a firm paying basis.

The men who developed the flotation process for dressing ores and made it profitable did so by giving as little time and attention as possible to chemical equations and all that they could to demonstrating practical methods of profiting from use of the process. And that is the way it will be with the shale oil industry. More knowledge of benefit to the industry will be gained by men who do the practical work at the number of pilot plants that have been erected in the De Beque districts—men who will not be chemists or technically educated—than the majority of the chemists can appreciate, and will prove a large part of the research work unnecessary.

Chemical Research Experts Retarding Development.

Discussing the outlook for the shale oil industry, a chemical and metallurgical engineer who also is a practical man when it comes to accomplishing things—who represents owners of more than 15,000 acres of oil shale lands in the De Beque district—was thoroughly disgusted at the reports coming from the oil shale conference at the Mining congress in Chicago, and pointed out how some of the talk regarding a "tremendous amount of chemical research" is retarding development of the shale oil industry.

"I can not agree with these claims," he said, "nor do I agree with the statements made at the shale conference that the production of oils, that can be refined successfully, can only be brought about as a result of extensive experimentation with the various combinations of hydrocarbons, assuming that this means we first must conduct a long series of ultra-scientific experiments and analyses,

with the object of studying them in all their complex relations, before we can turn out a product that will run and lubricate a fliver sufficiently well to make it a salable article at a profitable price.

"To such stuff I want to say that practically every important achievement in the petroleum or metallurgical industries was an accomplished fact long before the scientists had determined, or could explain, the various reactions involved in the process, or the physical "phenomena" that seemed to function regardless of the neglect of scientific investigation.

"In other words, some practical-technical man, who had become a utilitarian through long plant experiences, had beaten the ultra-technician to it by observing this and that, and trying out this and that until he finally succeeded in getting a combination that would function successfully. In many instances such a man has accomplished through keen observation and a little ingenuity, what the ultra-technical men declared impossible after long experimentation.

Super-Technicians vs. Practical Investigators.

"I can well recall the frantic attempts of the super-technicians to hold back the introduction of the flotation process in this country until they could conduct extensive researches into the physical phenomena involved, and supply the practical branch of the fraternity with a set of factors and formulae that they considered absolutely essential to a successful application of the process. Had the practical men waited for them they would be waiting yet.

"What the practical men did was to start on a process of elimination and learn what would not work. They rigged up machine after machine; tried a hundred and one different oils under an equal number of variations; varied the fineness of pulverization and the density of the pulp that went to the flotation cells, and did a hundred and one other stunts until they succeeded in doing what a lot of wise men said could not be done except after extensive research, if it could be done at all.

"The final success was not the result of any one man's, or any set of men's work, but rather a combination of achievements attained by many experimenters; and I say that a man who will, by his criticism, throw obstacles in the way of men like Ginot, Galloupe, Brown, and the many others who are making an honest effort to solve the problems of the shale oil industry on a practical working scale, and who can not appreciate the importance of such efforts, is a man who has had little experience in the practical development of industrial processes. Every encouragement should be given such men, and every other man who has an idea of sufficient merit to raise capital on. The more competition there is among inventors, and the more ideas that are given a trial, the quicker we will arrive at a successful stage of the industry.

Folly of Shale Conference Suggestions.

"It would be folly to do as was suggested at the shale conference—form a co-operative pool of shale men and centralize experimentation. We then would be getting the results of but a few men's brain-work and lose the stimulus of competition. We do not want that sort of co-operation. It certainly would expediate matters if there were a free exchange of ideas and of the results of experimentation, but I would just as soon hope for the millenium as to expect a lot of rival inventors to get together and swap ideas. There never has been and there never will be a free exchange of ideas during development of an industrial process. There were hundreds of laboratories working on the flotation process at the same time. Experiments were

going on everywhere, until the process of elimination weeded out the impractical methods and left the field to the few; and so it is going to be in the shale oil industry.

"The alleged 'many chemical and technical problems that confront shale engineers,' confront only the men who have made no progress or who are too lazy to try. There has been far more advance made than is generally realized, and many of these 'confronting problems' have been relegated to the rear by men who have been actively at work clearing the road to success. Some of them are going to arrive a long time ahead of the ultra-technical men, and it will be by a short cut that will eliminate most of the fancied obstacles.

Market for Oil Shale Products Soon.

"All this talk about the long time necessary for extensive research does not impress me at all. I expect to see shale oil products on the market just as soon as a stable market is established for them, and I do not anticipate a long wait for that market. These products may not, and probably will not, be the perfect products that the ultra-technical men are striving for; but why strive to produce such products when you can make saleable ones at less cost that will give entirely satisfactory results? It is probable that some years will elapse before we get around to the manufacture of all the refined products, and that we will have to be content for awhile with production of motor spirits, principally; but, as I frequently have stated, probably as much or more money can be earned on each dollar invested in a motor-spirits plant than could be earned with an expensive and complete refining plant. There is no question about producing a successful motor spirit from shale. This is a demonstrated fact now.

"There is much said about the red coloration and the high percentage of olefines, or unsaturates, present, and of the extensive research work still said to be necessary to overcome these assumed defects of the product. About the only reason advanced for making the attempt is to get a final product that will conform to the color of ordinary gasoline and approximate it in composition.

Harmlessness of Coloration.

"It is admitted that exhaustive tests have demonstrated the harmlessness of the coloration, and that the presence of a high percentage of olefines is a positive advantage so far as the fuel value is concerned; why, then, should we worry about them and attempt to eliminate them, any more than we should try to decolorize the lubricating oils on the market?

"In California, until the Standard withdrew the product from the market, many auto owners and most truckers and river boat men used a greasy, red distillate in their engines and claimed more mileage per gallon than with the best white gasoline. The red color did not prejudice anyone as long as the stuff had the kick and did not carbonize in the motor. And consider the stuff that is being put into Diesel and semi-Diesel engines every day in the year, and there will be little balking over a small amount of color in shale spirits.

"The public knows nothing about unsaturates and does not care a rap as long as the power is there and the fuel vaporizes at a low temperature. Why, then, as Russell D. George asks, attempt to remove them? It would be a criminal waste of 50 per cent of the product and a lot of sulphuric acid, and nothing gained other than a closer imitation of the stuff now on the market that they still call gasoline. The day is not far distant when the public will have to take what it can get, and once educated to the good qualities of shale spirits, it will not be finicky about a little color."

PLANS FOR EUREKA-UNCLE SAM

NEW MILL ARE BEING DRAWN.

Eureka, Nevada, Nov. 10.—During the past two months developments at the Uncle Sam Mining Company property has been such that their Engineer L. E. Rosinshine is now engaged in designing a combination reduction plant that will give assurance of high extraction of all values. The ore of Eureka are peculiar unto themselves. As a rule all ore mined in recent years has been shipped out and none has ventured to even propose a mill. L. E. Rosenshine, now engineer for the Eureka Uncle Sam, was for many years identified with the Charles Butters Company of San Francisco. This firm is famed the world over. For a long time Engineer Rosenshine has been experimenting with ureka ores, particularly the ore from the Uncle Sam. He is now ready to go ahead. His new mill, so he states, will combine the three ordinary principles of extraction—concentration, flotation and cyaniding. It is anticipated that the first 50-ton unit of the mill will be in operation by June 1st, next. For years Engineer Rosenshine has been making exhaustive tests of ore from the Uncle Sam, Hamburg and other ores of the Eureka district.

Frank T. Torpey and associates have only had possession of the Eureka Uncle Sam about one and one-half years. In that time they have developed it into what promises to become one of Nevada's big mines. Recently a cross fissure or ledge has been stripped for a distance of 50 feet with a width of from seven to ten feet. Values are said to average over \$20. This particular ore is said to differ from the ordinary ores of Eureka in that it responds to cyaniding without other process. This ore was found on a cross fissure or ledge on the Hamburg lode and is similar to ores found in the Winfall mine. It has been upraised on for a distance of 30 feet and still in ore, top, bottom, and ends.

This same fissure is now being drifted on easterly to intersect what is known as the Wade lode, which lays next the shale and to which lode a great part of the former rich production of the Hamburg mine is credited. It will be recalled that the Hamburg was one of the most sensational producers of early days when the camp of Eureka was producing millions. Calculations are that the Wade lode will be intersected within another 50 feet from the face of the drift.

The face of the main tunnel is now advanced 50 feet beyond the cross fissure that shows such a big ore body and from all appearances is about to penetrate another cross fissure. This is the cross fissure that has been the objective point of the tunnel for some time. Its outcropping on the surface shows very strong and carries high values. According to the dip of vein the face of the tunnel should be very near it. The formation has so changed that Superintendent States is of the opinion that a few more rounds of shots will expose the much sought for cross fissure.

The face of the tunnel is still about 500 feet from the Hamburg line. According to surface and other well defined indications there should be several more cross fissures encountered before reaching the Hamburg line. It will be seen from this that with the ore already exposed and the prospective ledges ahead the Eureka Uncle Sam is in line to become one of the big mines of Nevada. With the handicap of having to ship all ore and subject to long railroad haul and excessive freight charges and smelter penalties Eureka has been developed under difficulties. With a mill designed to handle the ores at home a new era of prosperity seems near at hand for Eureka. The mill being designed by Engineer Rosenshine is being designed to eventually handle custom ores as well as the product of the Eureka Uncle Sam.

COPPER MINES AT MACKAY, IDAHO, RESUME.

Idaho's biggest copper mines, located at Mackay, are to resume the production of ore, after a close down of several months, is the cheering news that has awakened Mackay this week. A wire from the office of L. R. Eccles, the president of the Idaho Metals Company, of Ogden, reached J. Ray Weber, who was continued as mine superintendent under the reorganized company, on Thursday, instructing him to put the compressor and other equipment in shape for immediate operation, says the Mackay, Idaho, Miner of the 2d.

Immediately upon receipt of the order men were put at work to put the plant in readiness for operation and Superintendent Weber expects to have the compressor operating the first of the coming week, when the broken ore, reserves will commence to move. There is a large quantity of ore broken and stored in the mine ready for shipment, as many leasers have continued mining operations since the compressor was closed down. Ore bins at the head house of the big tram are filled and this will move first, to make room for the ore reserves stored in the mine. It is estimated that from thirty to fifty railroad cars of ore is broken and ready for shipment at this time and with the resumption of operation of the compressor, mining will at once proceed by a large number of leasers and the ore production continued.

The tram-way has already commenced to operate to clean up ore bins and make room for the stored ore of the mines, which will commence to move as soon as the compressor operates, thus making a continuous stream of the product of Idaho's biggest copper mine.

Leasers who have been operating for the past year, many of whom continued work after the compressor was closed, have not only a large tonnage of ore broken and stored, but have developed a tonnage not heretofore known on the property, and during the period of non-shipment have put the ground in shape for the rapid mining of a large tonnage daily. Some thirty odd leases are in operation and the showing in most cases is indeed exceptional. This, added with the fact that many other leases will soon be operating, is an assurance of greatly increased production. The operation of the compressor, with the present large accumulation makes it possible for shipping records to be broken.

The opening of the property at this time will record the first operation of the copper mines since the Empire Copper Company was re-organized last summer, under the name of the Idaho Metals Company, with L. R. Eccles, president; Ralph E. Bristol, Vice-president; R. B. Porter, director; C. A. Boyd, director; H. V. Jenkins, director and H. D. Campbell, secretary-treasurer, with Director Jenkins continued as operating manager and Ray Weber as mine superintendent. Through the re-organization of the company, which practically included the old stockholders of the Empire Copper Company, the new company was placed on a sounder financial operating basis, completely cleaning up the loose end accumulation of a dozen years' operation under several changes of management, now rounding out one of the strongest companies in the west, in possession of a great copper property.

During these dull times the announcement of the Idaho Metals Company that it will commence operations is indeed cheerful news to the inhabitants of Mackay and the Central Idaho country, which section has felt the general depression all the more keenly on account of the close-down of the mines of the company.

Miners working in the property for many years state that the workings of the mines never did present a better showing than at the present time. The future outlook for

copper is encouraging and grows better day by day and this all tends to give Mackay a more optimistic business disposition than the Copper City has had for many moons.

**NEW MEXICAN GOLD DISCOVERY
DESCRIBED BY EL PASO MAN.**

Las Cruces, N. M., Nov. 10.—Gold has been discovered on the southeast slope of the San Mateo mountain near the Socorro county line, 115 miles northwest of Las Cruces, where until recently the formation has been held by veteran prospectors to preclude the presence of yellow metal.

The El Paso Herald, in its report of the "find," says that gold indications believed to be promising were lately found by W. A. Henley and sons, John and Charles Yapple, Capt. W. B. Townsend, late of the United States army in Siberia, and Loe Fulp and A. J. Willetts.

A. H. Raynolds of El Paso, brother of Josua Raynolds, chairman of the board of directors of the First National bank, El Paso, who has just returned from the scene of the new discovery, readily gave a Herald man his cautious and yet highly favorable opinion as to the actual situation there.

"It is a camp that only mining men or prospectors with, say \$500 to \$1,500 which they can spend, should investigate," said Mr. Raynolds. "It is no place to start a rush or a boom for a lot of poor people to get into expecting to make money quickly and easily, for it is, of necessity, not that kind of a camp."

"With that reservation and caution, I do not hesitate to say that in my 40 years of mining experience during which I have seen a good many gold camps, I have never seen in a new camp a larger or better showing of gold being present with the same amount of development work having been done, than I saw at this new camp where I have just spent a week."

"Free gold is shown here in place, in several 10-foot and 15-foot holes, and many pannings. The veins seem to be very large, and so far as I could make out no walls have yet been encountered. Only a little scratching has been done, but the showing of free gold in the pans is remarkable. In some of the rock the particles or dust of gold may be seen with the naked eye."

"The camp needs experienced prospectors with some money, who will push the development. While New Mexico gold camps have generally petered out and proved of little value after the first cleanup, this might prove to be the exception. It is one of those things that nobody can find out until he makes the test."

"At my home I have about five pounds of specimens of the newly discovered ore showing free gold. It is from a stringer three feet wide, at bottom of a 20-foot shaft in a 30 to 40-foot wide breast that all pans gold. I should be pleased to show the specimens to any mining man who may be interested in this really remarkable indication of a promising deposit."

"All conditions of the locality of the new camp are favorable to economic operation of mines and mills. It is to be hoped a thorough exploration will be made. Those already on the ground will welcome the right sort of men who will really help open the ground up."

The nearest stores and post offices to the camp are at Monticello, six miles, and Cuchillo, 12 miles. Both are in Socorro county. Elephant Butte irrigation dam and lake are in sight of the camp. There is plenty of wood and mountain water. Good roads lead to the camp, which is three miles northwest of the Flying X ranch and two miles east of the Redrock ranger station.

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FINANCIAL EYES SCANNING THE WEST.

That the upward turn in metal mining is coming along apace is evidenced in many directions, and particularly in eastern business and financial centers; and, out here in the far-west when we speak of the east, we have reference to all of that region lying east of the Missouri river. Only a few weeks ago a party of eastern business and railroad men came out into central Idaho to hunt for big game; before they left for home they had purchased a controlling interest in a well-known mining property which they declared would be extensively developed and operated in the spring. They came out into the "wild-and-wooly west" to capture "big game;" they returned highly elated with their success, because they captured more than they bargained for. The incident is referred to here because it throws a little light on a subject that now is beginning to attract attention in that portion of the country remote from the far-western metal mining states.

During the summer and fall months over 45,000 automobile touring parties registered in Salt Lake City; there were cars from every state in the Union—most of them from eastern states—and hundreds of them were headed for hunting and fishing grounds which are inseparable from the metal mining sections of Utah, Idaho, Colorado,

Nevada and Montana. It is safe to say that many of them carried their occupants over country which afforded a splendid insight into the metal mining industry first-hand. Many of these people probably already were more or less identified with metal mining and metal mining investments; others must have become imbued with the fact that there is more to the industry than they had previously imagined—that they had probably been overlooking opportunities that were worth investigating.

We imagine that some of the summer tourists through the western mining regions must have bumped into the scribes of their "home town papers" upon their return, for it is noticeable that, during the past few months, many of them have made reference to metal mining as though they had discovered "something new under the sun." To us in the far-west, where metal mining is as much of a business as cotton raising is in the south or manufacturing is in the east, it indicates that financial eyes are scanning the west and that people of means are beginning to learn that it will not be more difficult to make money in this region than to come out here and have a good time.

Why, even the New York Herald declares that mining is attracting wide attention in influential business and financial circles. This great metropolitan journal was quoted by a Denver paper the other day—and it shows the way the wind is blowing—as follows:

"It is an undeniable fact that many of the most influential business men of the world have turned their attention to mining, the source of nearly all wealth; for persons who have been enslaved to the idea that the only safe proposition was a five per cent or six per cent security, now realize that many millions of interest have been lost to them through heeding the advices of those interested in cheap money, and that among banking institutions of the West eighteen and twenty per cent is not considered a hazardous western profit or excessive dividend on the great majority of our gilded mining securities. And further, the richest men in the world are mining kings, many of whom have grown powerful enough through the proper application of originally a moderate capital, and it is proven that while millions of dollars have been lost in railroads, farm mortgages, eastern industrial and building associations, the American mining industry steadily advances, making enormous profits for its supporters, building great states and cities and pointing with pride to the American possession of 253 mines that have paid it dividends over 625 millions."

GOOD EXAMPLE SET IN CARBON COUNTY.

Following a long and vigorous fight that has been waged by the people and papers of Carbon county, Utah, it is refreshing to note that a full and comprehensive financial statement of the Carbon County school district has been made and published. We do not know that charges of wrong doing have ever been made and we do not know that the district school authorities have been averse to making detailed statements such as that contained in a Price paper of October 28th. We believe that the contention has been that our laws did not require that a statement should contain in detail for what purposes and to whom all moneys disbursed should be made; but that was what taxpayers wanted to know, and their requests or demands have been met.

In the report as published the usual financial statement is made and properly attested, and then follows several columns of detailed information under the general heading of: "Detailed statement of moneys paid out, to whom, and for what paid." This portion of the statement gives the names of board members and the salaries paid to each, names of teachers, and salaries paid to each, etc. The same detailed information is given with respect to salaries of janitors, drivers, dormitory employees, fees paid to election judges, and, more than that every merchandise account paid is given in detail—who the money went to and what for.

The statement is one in which the taxpayer can see just what has been done with his money as plainly as though he had made the disbursements himself. And that is as it

should be, whether the law demands it or not; and that is just what the people are going to demand from their public servants in every department of state, county and municipal government in the state of Utah before long. Carbon county has started the ball rolling; let's boost it along.

HOW A MAN SHOULD VIEW HIS JOB.

The following criptic sentences, uttered by Arthur Capper, U. S. Senator from Kansas, are commended to industrial strife breeders and others who prefer idleness to thrift, and particularly that rapidly expanding element of society which counts "work" as degrading:

"A man's job is his best friend. It clothes and feeds his wife and children, pays the rent, and supplies them with the wherewithal to develop and become cultivated. The least a man can do in return is to love his job. A man's job is grateful. It is like a little garden that thrives on love. It will one day flower into fruit worth while, for him and his to enjoy. If you ask any successful man the reason for his making good, he will tell you that first and foremost it is because he likes his work; indeed, he loves it. His whole heart and soul are wrapped up in it. His whole physical and mental energies are focused on it. He walks his work, he talks his work; he is entirely inseparable from his work, and that is the way every man worth his salt ought to be if he wants to make of his work what it should be, and make of himself what he wants to be."

A DISTRIBUTING SYSTEM NEEDED.

Statisticians state that the gold holdings of the United States reached a new figure last month when they mounted to the stupendous sum of \$3,500,000,000. This amount is estimated at 35 to 40 per cent of the world's visible supply.

Beer has, in a sense, been restored to some of us, but now that we can have it, we don't want it. In the language of the song, "We want what we want when we want it."

A prominent Salt Lake business man returned from Los Angeles the other day and was quoted in a daily paper as having been greatly surprised by the number of local people he found in the coast city, "every one of whom was 'knocking' Salt Lake." What's the matter? Why do people leave here and cast aspersions on this city and state? If such conduct is deserved is it not time that our Commercial, Rotary, Kiwanis and other booster clubs get busy and ferret out the underlying trouble—and clear up the situation? We never hear a Denver, Los Angeles, San Francisco, Seattle, Butte, Boise or Ogden man "knocking" his town. What's the matter with Salt Lake, anyway?

A number of copies of the Salt Lake Mining Review found their way into hands of people who attended the recent American Mining Congress session at Chicago. Result: a half-hundred new, paid-in-advance subscribers. We thank you.

COMSTOCK LODGE LITIGATION LOOMS.

Claiming extra-lateral rights to a valuable part of the Middle-mines section of the Comstock lode, the Comstock Exploration Co. is preparing to bring suit against the Comstock Leasing Co., operating the Chollar and Potosi mines, for the value of ore extracted by that company, says the Nevada Mining Press. Dr. Raymond N. Murphy, a San Francisco dentist and former Comstock resident, is president of the Comstock Exploration Co., which claims to have the foot-wall of the lode within the lines of its

Olympic, a long, narrow claim that sidelines the Potosi and Chollar mines on the west.

P. A. McCarran, Reno attorney and former member of the supreme court, attorney for the company, states that there is no doubt that the foot-wall of the Comstock is within the Olympic claim, and that suit will be brought unless settlement is made for the ore extracted. Judge McCarran also states that officials of the Comstock Exploration Co. has conferred with W. T. Moran and Fred W. Spaulding, owners of the Pride of Washoe claim, adjoining the Olympic on the north, concerning apex claims that may be asserted by that company. The Pride of Washoe sidelines the Best & Belcher, Gould & Curry, Savage, and part of the Hale & Norcross. All the properties mentioned and the Bullion and Exchequer are being examined and sampled for the Boericke interests of Philadelphia by Albert Burch, San Francisco mining engineer.

The Comstock Leasing Co. has a lease on the Chollar and Potosi mines and for several years has been treating the ore extracted at its mill in Six-mile canyon, the old Ophir plant. The venture was financed by Paul Honeywell of Denver, who owns the Hale & Norcross mine. H. B. Bulmer is superintendent.

NEW BOOKS RECEIVED.

Oil-Field Practice by Dorsey Hager, petroleum geologist and engineer, author of "Practical Oil Geology," etc. First edition, McGraw-Hill Book Company, (Inc.) New York. Price \$3. For sale by the Salt Lake Mining Review.

Everyone familiar with Hager's "Practical Oil Geology" will be quick to grasp the idea that there must be something worth while in this new 310-page pocket size compendium on oil field practice by Mr. Hager. The author has anticipated the needs and requirements involved in developing oil properties and in this volume has undertaken a compilation of the best features of American methods, as exemplified in present-day practice, from the best authoritative sources. There are chapters on development-drilling, development-production methods, transportation, storage, fires, avoidable oil field wastes and losses, elements of valuation, buying oil properties, etc., legal forms, tables, drawings and illustrations, galore. The kinds of machinery and tools required, labor costs and numerous other details of the oil business are assembled in such form that the oil operator and field force may readily secure the information needed by consulting the book, and without waste of time. Those who may be now or who may contemplate operations in new fields, will find this book a handy "piece of furniture" to have around or in the pocket.

Handbook for Field Geologists, third edition just out, by C. W. Hayes, Ph.D. Revised and rearranged by Sidney Paige. Contains 166 pages 4 1/2 by 6 3/4 inches. Flexible binding. John Wiley & Sons, Inc., 432 Fourth Avenue, New York. Price \$2.50. For sale by the Salt Lake Mining Review.

The first edition of this work was published in 1909. This third and enlarged edition covers everything contained in the first and second editions. This revision of the work was undertaken by Mr. Paige in response to a continued demand for a handbook of general geologic practice. No alterations have been made in the fundamental plan of the book, although a number of minor rearrangements have been effected. A brief mineralogy, prepared by Dr. E. S. Larsen, of the Geological Survey, has been added. Methods of geologic work with the plane-table have been revised and certain recently developed tables for useful calculations in stratigraphy have been added. This latest edition of Dr. Hayes' work comprises only 5,000 copies, so the issue will probably be quickly exhausted.

MINERS' FIELD DAY, BUTTE, MONTANA.

By D. Harrington*

In order to stimulate general interest in mine safety among their employees, the mining companies of Butte, Mont., instituted in 1918 a Miners' Field Day, and this field day has since been held annually about the end of July, the last one being on July 25, 1921. The mining companies of the Butte district finance this meet in proportion to the number of men employed at the time of the meet, the contributing companies with number of working force, and proportional contributions for the opening field day in 1918 being given below:

Company	No. Employed	Amount Contributed
Anaconda Copper Mining Co.....	12,500	\$1,078.52
Butte & Superior Mining Co.....	1,800	155.32
North Butte Mining Co.....	1,294	111.67
East Butte Copper Co.....	850	73.36
W. A. Clark Interests.....	600	51.78
Davis-Daly Mining Co.....	310	29.35
Total	17,354	\$1,500.00

Note: In many mining districts it is now the custom to hold an annual Miners' Field Day. The field day, as a rule, is financed principally by the mine operators, and was instituted primarily to promote interest among miners in the "Safety First" movement. Usually demonstrations or contests in first aid and mine rescue are the leading feature of the day's events, which include games, races, dancing, and all the other amusements usual to a gala holiday. Thus the field day serves the double purpose of stimulating interest in mine safety and promoting cordial relations and community fellowship. This paper is an interesting account of the way in which the Miners' Field Day in the Butte district is organized, with data on costs, plan of organization, method of conducting, and the practical benefits derived from it.—Ed.

The cost to the mining companies of the annual field days since their inception in July, 1918, has been as follows: 1918, \$1,500.00; 1919, \$2,000.00; 1920, \$3,500.00; 1921, \$1,500.00.

The field meets are held at Columbia Gardens, a pleasure park which is situated on the flank of the Continental Divide, a few miles from Butte, and is reached by an excellent trolley service and automobile roads. The park has a baseball field with grand stand, cinder track, etc., where all the athletic contests are held; shady picnic grounds provided with tables for lunching parties; a band stand for musicians, and a fine dancing pavilion. The estimated attendance at these annual field meets to date is as follows: 1918, 20,000; 1919, 16,000; 1920, 18,000; 1921, 7,000.

The decreased attendance in 1921 is attributable to the fact that nearly all Butte mines had been closed for several months due to the general industrial depression, and, moreover, a heavy rainstorm about noon of the day of the meet kept many from participating. From the above it will be noted that there has been a total attendance of over 15,000 per meet—the entire population of Butte, even in 1918, being probably little over 60,000.

Management of Meet—Features.

The meet is managed by a general arrangements committee composed of safety men from each of the contributing companies. The program is somewhat varied from year to year to avoid sameness and it is aimed to interest not only the miner and the mine operator, but also their families, including those of all ages, sexes and nationalities. There are races of all descriptions, such as potato race, egg spoon race, relay race, sack race, and wheelbarrow race, also women's nail-driving contest, and 100-yard dash. Some of these contests are restricted to certain ages and sexes, and others are open to all comers, but all persons present are provided for and cash prizes are given the winners.

One of the main features at each field day is the baseball game, for which a purse of \$100.00 to \$200.00 is given the winner; the rivalry is intense, especially in the past

two years as the game has been participated in by teams from the league of Butte mines, the Butte mining companies maintaining a baseball league with players working in the mines and having a schedule of games extending over the entire summer. Other purely athletic events on the field day include boxing, wrestling, possibly association football, etc., for all of which cash prizes are offered.

During the day one or more bands is in attendance, and at night there is a free dance and the excellent dance pavilion is thronged, generally over 1,000 couples being present. Occasionally motion pictures are shown, or there is a banquet held at which safety men, mine operators, inspectors, and others "swap" experiences.

Underlying Objects of the Meets.

The main underlying object of the meets is the forwarding of interest in first-aid work, and at each meet a first-aid demonstration is held, each person who participates receives a cash prize, but there is no contest. In 1918 there were 33 first-aid teams on the field, in 1919 there were 26, in 1920 there were 20, and in 1921 there were 12. On one of the above-mentioned years all first-aid teams participating in the demonstration were required to be new to the work, so that more than 100 men were trained in first aid for the first time in order to participate.

In connection with the 1920 field day, there was inaugurated an intensive safety campaign in the operating mines, extending from July 19 to August 14, the meet being held August 16. A \$200.00 banner was offered the Butte mine having the least number of accidents in proportion to number of miner's shifts worked during the period. The Butte daily newspapers featured the contest by publishing the daily progress and standing of all mines, and above the entrance to one of the main moving picture theatres in Butte a large chart was placed giving daily standing of the mines. Some remarkably good records were obtained, and after the contest the "Anode," the safety paper of the Anaconda Copper Mining Co., announced that employees of twelve operating mines competing for the prize had lost only 256 shifts from accidents during the period of the contest, as against 1027 days lost from the same cause during the same period in the preceding year when no contest was in effect, though there were a total of 52 per cent more shifts worked in 1920 than in the same period in 1919.

A "mucking contest" is usually held in which a weighed quantity of ore is shoveled from a smooth platform into an ordinary ore car, all being placed on heavy trucks in front of the grand stand. Here also intense interest is displayed, as the contestants are men of various sizes, ages and nationalities, and each has his friends and well wishers. In the 1921 mucking contest the winner shoveled 1545 pounds of ordinary Butte ore from a smooth platform into an ore car in 2 minutes and 3 seconds. Hand drilling contests have been held, also ladder climbing contests for shift bosses, pole climbing for electricians, etc.

While the field day was instituted primarily to foster interest in first aid and mine rescue work and, incidentally, in general mine safety and accident prevention, its actual results have been more far-reaching. With all the rivalry engendered by the various contests, there is remarkably little ill-feeling, and, in fact, the most friendly spirit exists. The miner and shoveler are found talking with mine owner or official, bosses of rival properties sit together in the grand stand or in the bleachers and "root" in the friendliest manner for their respective teams. One knot of mining men will be found discussing the relative merits of various kinds of machine drill bits; another group will be discussing mine fires, their causes, and methods of preven-

*Supervising mining engineer, Bureau of Mines.

tion and handling; others will be talking of rill stoping as against square-set stoping for various kinds and conditions of ground, and for weeks after the meet there will be exchanging of visits in connection with mining practices.

The Bureau of Mines has participated in the work of making arrangements and training miners in rescue and first aid for all of the meets held to date, and Bureau representatives feel that the Butte annual miners' field day representatives feel that the Butte annual miners' field day is an unqualified success, not only as regards the forwarding of first aid and mine rescue work and of general mine safety and accident prevention, but also as to the opportunity it presents for the dissemination of information on efficient modern mining practices and the growth of general good feeling. The Butte mining companies are to be congratulated for their progressiveness in establishing such an excellent institution, and it is to be hoped that there will be no interruption in the holding of the field day annually for a number of years to come.

LIFTING OF THE RAILROAD STRIKE QUICKENS INTEREST AT KATHERINE.

By William P. DeWolf.

Kingman, Arizona, November 10.—Investment interest in the mines and prospects of the Katherine district has been quickened by the lifting of the railroad strike menace, which for a time laid an embargo on the starting of new work and threatened to slow down the work already under way there, as with the passing of the crisis the continuation of interrupted traffic is assured and the danger of a lack of mining essentials is removed. This means much to a district that is just coming into public recognition.

Very recently the district was visited by several geologists and mining engineers of standing, representing important outside mining interests. At the same time the district was visited by a number of mine operators from Pacific coast points, and their visit was followed by the decision to immediately develop the Big Four group of claims.

The Big Four group is located near the Gold Chain mine, and will be developed under the direction of James F. Collins, of the engineering firm of Willis and Collins, as general manager; Harry K. Le Clair as mine superintendent, and W. W. Wishon, of Searchlight, as consulting engineer. A development fund of \$30,000 has been subscribed and will be used for opening at depth a vein that assays from \$2 to \$5 gold per ton across a width of 40 feet at surface. Mine machinery, it is stated, is to be installed at once.

At the Gold Chain mine the north crosscut from the east drift on the 100-foot level has been extended 50 feet without disclosing the hanging wall of the vein, which, where intersected in No. 1 crosscut north, shows 46 feet of milling grade ore. This condition indicates that the vein is considerably wider at the present point of exploration—140 feet east of the shaft—than it is where first crosscut. Superintendent Nourse reports all headings in ore, and that preparations are being made to extend the east drift to the Gold Chain-Comstock Consolidated boundary.

The winze on the 400-foot level in the bonanza Katherine mine is showing free gold ore that assays as high as \$300 a ton at a depth of 75 feet. The winze is being sunk along the footwall of the big Katherine fissure, which has a width of from 15 to 65 feet, and from collar-set to bottom is in high grade quartz. The new and more powerful plant of mine machinery will arrive at the property the current week, and will immediately be placed in position, as the concrete bases are in readiness to receive it.

Development work at the Nevada-Katherine property,

located in the Tristate, Nevada, section of the Katherine district, demonstrates it to have large ore-yielding possibilities. The tunnel now has a length of 120 feet and near its face crosscuts are being driven to the north and south. This work is expected to locate in place the rich ore, showing gold in the free, that was found at surface. The management plans to place a 10-foot Pelton water wheel in the Colorado river near the portal of the tunnel to generate power for operating air-drills and for lighting purposes in the camp of Tristate. Los Angeles people are backing the project financially.

FLOTATION ENGINEER VISITS CITY.

Dr. H. J. Stader, widely known flotation engineer, representing the naval stores division of the Hercules Powder Company, with headquarters at Wilmington, Delaware, has been spending several days at the company's local branch offices in the Kearns building, including several side trips to near-by mining districts. He is now headed for the northwest and will spend some time on the coast before returning east.

Dr. Stader announced while in Salt Lake that hereafter all patrons of the Hercules company would transact business at the various branch establishments of the company throughout the west and elsewhere, rather than through dealers, as formerly, the purpose being to render first-hand service at all times. Since the acquirement of the Yaryan pine oil works, at Brunswick, Georgia, a few months ago, the Hercules company is rapidly bringing the output up to capacity.

The country's flotation oil requirements aggregates more than a million gallons a year and of the total the Hercules company supplies about 60 per cent. Five grades or classes, of flotation oils are produced by the company and every problem embodying the use of the flotation process receives most careful consideration and attention at the hands of Dr. Stader, who declares that every requirement of the millman's needs are cheerfully met.

Dr. Stader has travelled much during the past twelve months and he figures that he has personally visited not less than 95 per cent of the mills of this country using, or contemplating the use of, the flotation process during that time. He states that his investigations indicate that the mining industry will experience a great revival during the year to come; that preparations are everywhere making for a general resumption of operations by the larger operating concerns.

DEAL PENDING FOR OURAY MINES.

P. F. Welch and C. C. Worland, representing The Western Mines Exploration Syndicate, the members of which are composed of wealthy oil men of Wyoming and Colorado, have been at Ouray, Colorado, looking over and having an examination made of the mining and mill property recently acquired by The Union Mining company and formerly owned by the Wanakah Mining company. This property is situated about one mile below Ouray and is considered by local mining men as one of the best properties in this mining district, says the Ouray Herald.

The examination is being made by D. R. Findlayson, an expert mining engineer, assisted by Charles Blaka, and will be thorough in every particular. Their findings will determine whether the new syndicate will take over the property, subject, of course, to ratification by the stockholders at a special meeting to be held at Colorado Springs.

Should this syndicate acquire the property, its members are amply able financially to work the mine and mill to the best possible advantage.

Around the State

Reports from Ophir are that the Ophir Hill Con., the Senator W. A. Clark mine, has taken a two years' option on the 12 patented claims of the Ophir Coalition for \$115,000.

N. A. Dunyon and J. D. Fisher of Salt Lake have been granted a metalliferous lease on 80 acres of state land in sections 2 of township 3 south, range 4 east, by the state land office.

It is reported from American Fork district that lessees have struck a body of rich ore in the Silver Wave property. The ore is said to run high in silver, copper and lead. The Silver Wave is owned by Kent O. Keyes, a well known railroad man, and associates.

Fire has again broken out between the 1400 and 1500-foot level of the Utah-Apex mine, and gas has penetrated some of the workings of the Utah Consolidated mine, as these mines are connected by tunnels. The fire started in 1917 and was bulkheaded off from the other workings. Other bulkheads will be constructed at once in both mines, and it is believed the fire will be brought under control.

Eighteen inches of copper-gold ore has been opened up in the Clementine mining property, according to M. C. Morris, secretary of the company. Both in regard to mineralization and situation, the Clementine property is unique. Situated but an hour's ride from Salt Lake City, on the north side of the mouth of the Little Cottonwood canyon, and already productive of some very rich gold ore, its owners claim that the property has a future as promising as its mineralization and location are unique.

Two new roasting furnaces are being installed at the Tintic Standard Mining company's mill at Dividend, Utah, in the East Tintic district, according to E. J. Raddatz, president and general manager of the corporation. When the new roasters, making a total of nine, are installed, the mill's capacity will be increased to approximately 200 tons daily. Mr. Raddatz is confident that, if no unforeseen delays arise, the new furnaces will be ready for operation by December 1.

Rapid progress is being made in a new tunnel being driven to open the Vipont at depth. The tunnel portal is about 200 feet from the mill and the tunnel will open the vein at a depth of 700 feet on its dip. The tunnel is in 650 feet, and is going in at the rate of 200 feet a month. The ore zone is expected at 1800 feet. From the objective of the tunnel a drift will have to be run 400 feet to connect with an incline now being sent down from the "A" level of the mine. The shaft is on a 35 degree incline and is to be sunk to a depth of approximately 745 feet.

Within the next few days Thomas Davis and Jack Brisby, Silver City miners, expect to place on the market a carload of high grade silver ore from the Butcher Boy ground on which they have a lease. Some of the ore which they have mined during the past week or two carried in the neighborhood of 2000 ounces silver per ton and it is understood that they have exercised considerable care in the mining of their ore and that their initial carload will contain two small lots, one of "high grade" and another which is much better than the average run of silver ore from this district.—Eureka Reporter.

The Alta Tunnel & Transportation company has made settlement on the fourth lot of ore shipped since October 1. The silver in this lot averaged higher than for any of the previous shipments, running nearly 46 ounces to the ton, according to officials of the company. Since the discovery of the ore about 200 tons have been marketed. The first three lots netted the company about \$40 per ton after

deducting hauling and treatment. The fourth lot, judging from its appearance, will run still higher. The company minimum of ten tons a day.

Values of the second shipment of ore from the New Quincy mine show a decided improvement as compared with those of the first carloads, according to information received at the company's local offices yesterday. Control assays of the lot of thirty-nine tons, dry weight, showed the following values: 90 c in gold, 76.2 ounces in silver, 19.2 per cent lead, 1.5 per cent copper, 37.2 per cent insoluble, 2.6 per cent iron, 16.3 per cent zinc and 12 per cent sulphur. According to officials of the company, this shipment will net the company about \$66 per ton.

Development work is being carried in the New Quincy in the Park City district under favorable conditions, according to Arthur L. Thomas, secretary of the company. At the present time, approximately enough ore is being mined in the property to pay current operation costs. Officials of the company are planning present development work so that future working facilities will be as convenient as possible under existing physical conditions. Approximately 4000 feet from the Little Bell shaft, on the 700 level, a winze is being sunk on a line bed with the two-fold purpose of exploring the formation and also to make a connection with the Harrington raise. About 184 feet more sinking will be necessary to complete this piece of work, officials of the company say.

Construction Notes

Murtaugh, Idaho, Irrigation district to build a \$494,500 pumping plant.

It is reported that a milling plant for the treatment of ores of the Silver Reef Mining Co., at Unionville, Nevada is being seriously considered.

The Big Chief Consolidated Mines Co. plans to build a mill in the spring. The mines are near Midas, in the Gold Circle district, Elko county, Nevada.

The Manhattan Consolidated Company, of Goldfield, Nevada, has announced that it will erect a 1000-ton per month chlorination mill. Estimated ore reserves are 80,000 tons.

The Ramshorn Mines company, with offices at 321 Felt building, Salt Lake City, Utah, requests bids on a contract basis for doing approximately 1000 feet raising and drifting at the Ramshorn mine at Bay Horse, Idaho.

President Cal. Brouger, of the Tonopah Divide Mining Co., is reported as saying that ore reserves are sufficient to warrant the installation of a mill. Ore is now being hauled to the Belmont Mill at Tonopah, at a cost of \$1.75 per ton. The average grade is around \$30 per ton.

W. P. Fowler, of Hailey, Idaho, returned from Pittsburgh early in the month, where he had been attending a directors meeting of the United Metals Mining Co., operating in the Seafoam district, Idaho. He reported that a decision had been reached to build a mill as early in the coming year as possible. Development of the company's gold property is to be continued throughout the winter.

An aerial tramway six miles long will be built in the San Jacinto mountains near the southern border of California according to plans recently announced at El Centro, Calif. The purpose will be to connect Coyote Wells station on the San Diego and Arizona railway with deposits of marl and sand, the sand being 95 per cent silica, the type used in the manufacture of plate glass. Sand of this composition is being imported from Belgium by American glass manufacturers.

In Nearby States

ARIZONA.

Dewitt Bisbee, one of the first residents of the Bisbee mining district, and for whom the town of Bisbee was named, died recently at his home in Randsburg, California.

The Superior & Boston company, of Globe, has received from the El Paso smelter returns on a carload of ore that averaged 195 ounces of silver to the ton. The ore came from a new strike on the S. & B. property.

The United American has sunk the winze to the water level. Here they stopped sinking, not being equipped to handle the water through the winze. They will cross-cut and start exploring the ledge from this depth, which is close to the 1000 level.

Judgment was recently entered by the superior court of Yavapai county in accordance with the verdict of September 21, awarding David H. Biles and Samuel P. Wells a dollar as damages due to the smoke injuries inflicted by the smelter of the United Verde Extension Mining Company on Verde Valley crops.

The Tom Reed laid off 70 men on October 23rd. They are cutting down expenses at once. More men will be laid off on the first of the month. They are putting through the mill nothing but the better grade of ore that should show profits instead of loss. It is understood that the ledge on the 700 has been a disappointment in values. In ordinary times this ledge could be mined and milled at a profit, but under present conditions, with high cost of material and a big increase in power costs, the margin of possible profits are so small that the company does not feel "the game is worth the candle."

At a recent special joint session of the two houses of the congress of the Copper Queen Branch, Phelps Dodge Corporation, W. H. Webster, assistant manager of the Copper Queen Branch, announced that steam shovel stripping operations on Sacramento Hill will be suspended October 31. This step will mark the end of the big Sacramento Hill program prior to the time that ore production will be required for the concentrator now being completed south of Warren. Steam shovel work at Sacramento Hill was started more than four years ago. Since then 6,500,000 cubic yards of material have been removed.

In connection with the announced opening of one reverberatory furnace at the Miami smelter of the International Smelting company about Nov. 20, Thomas H. O'Brien, general manager of the smelter and also of the Inspiration Consolidated Copper company, announced that the copper company would employ 100 additional men at the Inspiration and Live Oaks mines and in sinking a shaft on recently acquired porphyry property. Two hundred additional men will be employed at the smelter. This does not indicate a general resumption of mining, it was said, but is the first improvement in the copper mining situation in months.

BRITISH COLUMBIA.

Receipts at the Trail smelter of the Consolidated Mining and Smelting Company of Canada averaged more than 1000 tons of ore daily during the last ten days of October. Several mines of the Slocan, which have been idle for a long time, are shippers once more. Total receipts during the

last ten days of the month were 10,963 tons, making the total for the year 337,201 tons.

The Traylor Engineering and Manufacturing company, with offices in the Mohawk building, Spokane, Wash., has secured a contract for machinery for the new mill which is being built by the Britannia Mining & Smelting company, at Britannia Beach. The contract price is reported to be \$120,000. The plant being built will be the largest reduction works in B. C. with a capacity of 2500 tons of ore daily and will cost about \$1,000,000.

COLORADO.

The Colorado Fuel & Iron company has acquired control of a second big deposit of hematite of iron in Navajo county and it is expected that development will be undertaken at an early date.

The Albion Mining company at Dumont is making preparations for the completion of an aerial tramway from the mine to the railroad, work upon which had been suspended for lack of funds.

Recently the Hidden Treasure Mines management started operating mine and mill on a power basis and has gradually increased the mill operations to three shifts per day. Everything is now going well with the work there, both mine and mill, and production will be regular from this time on.

The Surety Gold Mining Company, which has been operating up Ute creek, near Idaho Springs, for the past two years, has put on another crew and is now working two shifts a day. R. C. Lane, the president and manager of the property, reports that development work on the property has not stopped during the two years that he has been working there.

C. R. Wilfley, John and Eugene Schwend, Ralph Kullerstrand, C. V. Bates, E. E. Wheeler, James Doran, Axel Erickson, George and Bernard Butcher and Frank and Harry Curtis of Ouray, have formed a leasing partnership and taken a certain portion of the lower level workings at the Barstow mine. They have started the four last named doing the mining and the others each carrying a certain interest.

IDAHO.

The Iron Dyke property, near Homestead, claims ore carrying values of \$23 a ton in silver, with a 20-foot ledge and is equipped with a 125-ton flotation plant, but is not operating at present.

The Copper Syndicate properties in the same district are developing through a 2500-foot tunnel, with crosscuts and winze. The vein is 25 feet in width and carries values of \$25 to the ton in silver, gold and some copper.

Frank M. Smith, director of the Bunker Hill & Sullivan Mining Concentrating Company, with offices in the Paulsen building, Spokane, Wash., has recently returned from the Porthill district of Idaho, where he visited the Idaho Continental Mining Company's property, and reports the company shipping about twenty tons of ore daily, with about 1,800 tons of concentrates on the dump ready for shipment.

Several persons from Spokane, Wash., and vicinity attended the annual meeting of the stockholders of the Beer Creek Mining Company at Wallace, recently. The company does not expect to resume extensive development before spring. Directors chosen are: L. L. Sweet, Wallace, president; J. F. Forrest, Otis Orchards, vice president;

Joseph F. Morton, Wallace, secretary-treasurer; Frank R. Curran, Butte, and John Norman, St. Regis, Montana.

With organization of the Galena Mining Company, the Chicago-Boston Mining Company and the Killbuck Mining Company, two well known organizations of the Coeur d'Alenes, will pass out of existence. The Galena company has been organized to take over the other two. The new company will have 2,500,000 shares, of which 1,500,000 will go to stockholders of the Chicago-Boston and 1,000,000 to stockholders of the Killbuck. The Callahan Zinc-Lead Company of the Coeur d'Alenes will control the new organization as it did both of the others.

Forest service men put up a bitter fight against the Echo Mining Company, a fight which has lasted for years, and after most of the stockholders had despaired of winning and most of the directors had left the country, the forest service men finally lost their case before the secretary of the interior and the company learns that it can secure the patent it applied for. It holds mining claims in the Burke district of the Coeur d'Alenes. Its claims are among the oldest in that region and mining men say the property is promising. Without officers or directors sufficient to hold a board meeting a justice of the peace has called a stockholders meeting to be held on the 24th of this month. At last report, O. A. Olin was president and G. B. Harrington, secretary-treasurer.

F. D. McDonald, of Minneapolis, returned recently from a trip to the property of the Idaho Gold & Ruby Mining Company near Leonia. Two years ago he spent a week at the property after he and other eastern men had become interested. "Development accomplished since I was there two years ago has been marvelous," reports Mr. McDonald. "This is particularly so of the equipment which has been installed for handling huge volumes of gravel. In the last sixty days work has been confined to cementing the creek bottom for runs in future years. This work has been necessary to bring the values into the sluice box. With about 80 men on the payrolls this work should be completed within a few weeks."

MONTANA.

Charley Whitcomb, an experienced and practical mining man of Helena, is preparing to revamp and equip the mill with modern machinery for milling the ores of the Polaris mine near Elkhorn Springs, owned by the Silver Fissure Mining Company.—Dillon Tribune.

Two changes in the board of the Intermountain Copper Mining Company were announced recently at Spokane, Wash. They are Donald Callahan, who succeeded his brother, the late James Callahan, and John Hays who succeeded A. L. Nicholson, who resigned on account of illness. Mr. Callahan is a director of the Callahan Mining Company and the Chicago-Boston Mining Company, and Mr. Hays is president of the Flynn Group Syndicate of the Coeur d'Alene region. Operations are proceeding on the property of the Intermountain company, 12 miles north of Iron Mountain, Montana.

NEVADA.

Bullion from the Wyoming Mines Co.'s plant at the camp of Taylor will be shipped within a few days, following a clean-up that has been in progress. The mill is said to be operating in a satisfactory manner and effecting a high extraction of metals.

A shipment of 35 carloads of copper left the McGill smelter of the Nevada Consolidated Copper Co. for Balti-

more, Md., two weeks ago, to San Francisco by rail, thence by boat through the Panama canal. It was stated that 4000 tons of copper, or about one-half the total on hand when operations were suspended, had been shipped to date.

Theo. H. M. Crampton, who with his brother, Frank, promoted the Silverhorn district, was in Ely during the week and yesterday went to the Koleček mines, on Cleve Creek, the two brothers having an option on the property with a view to its development on an extensive scale.—White Pine News.

Shipping operations have been resumed by the Bristol Silver Mines company at Pioche. A brief suspension of shipping was made necessary by the breaking of the tramway cable used in transporting the ore from the mines at Bristol to the bins at the Jackrabbit terminal of the Pioche Pacific railroad.

The pumps have been pulled from the 365-foot level of the Great Bend Consolidated mine for use if needed on the 236-foot level. The crosscut from the shaft on the 236-foot level to explore the western portion of the mine, is now out twenty-five feet. This portion of the Great Bend has never been explored. During the early days, however, a considerable amount of high-grade was shipped from near the surface. The plan of the management is to develop the westerly portion of the mine.

Specimens of high-grade silver ore from a new strike in No. 4 tunnel of the Betty O'Neal mine were shown recently by Manager N. H. Getchell. The ore is almost solid metal showing galena, tetrahedrite, and what appears to be secondary argentite. The vein is seven feet wide of good grade and 18 inches on the hanging wall runs close to 2000 ounces of silver per ton. Several important ore bodies have been opened from the 150-foot level in the past three months and a mill will be built early next year.

Bullion valued at \$40,407.48 was shipped to the mint by the Rochester Silver Corporation a few days ago, the result of a clean-up from two weeks operation. The shipment, consisting of eight bars, was the largest for an equal operating period within the past two years. In September the total of bullion shipments was \$59,298 and the total for the quarter ending September 30 was \$721,911. At the close of September the report of Manager Bennett showed current live assets of \$274,617.63 and current liabilities of \$33,521.40.

A conference between representatives of the railroad, the public service commission and ore shippers, will be held at Carson City on November 18, with a view of revising the ore rates from all Nevada points to Utah and California smelters, says the Reno Gazette. It is contended by Nevada shippers that the freight rates on ore are prohibitive in many instances and that the mining industry of the state is being curtailed greatly because of this fact. The railroad companies have expressed a desire to discuss the matter and the shippers are now preparing data to present at the meeting.

Following the completion of preliminary sampling of the Middlemines group at Virginia City, involving the cutting of several thousand samples from the surface and from workings accessible through the Hale & Norcross tunnel, a more thorough system of sampling has been started in these properties. Three shifts of men were put to work recently, by R. B. McInness, superintendent for the Boericke brothers, who hold options on the properties. The work is under the supervision of Albert Burch, mining engineer, who has made frequent trips to inspect the old mines and direct the progress of sampling.

The lode deposit in the Ruth mine, at Ely, is developing into a wonderful body of copper ore that promises to

ival the huge deposit of disseminated copper in the porphyry in the matter of profits to the Nevada Consolidated Copper Co. Although the big concentrating plant and the smelter at McGill are idle, development in the Ruth mine continues with a force of 60 men and it is surmised that this direct smelting product will be mined and treated at the company's smelter before work is resumed in the steam-shovel pits. The orebody is of wide dimensions and high grade samples returning from 4 1-2 to 25 per cent copper. It has been explored to a depth of 750 feet.

Earnest L. Bingham, publisher and editor of the *Fallon Standard*, died Friday morning, October 28th, after an illness of only a few days. The immediate cause of his death was erysipelas complicated with throat trouble. Dr. W. C. Lucas was in attendance and was assisted in consultation by Dr. G. L. Dempsey and Dr. St. Slair. Everything possible that medical skill or nursing care could provide was done, but without avail. He had been in poor health for a number of years, but had continued with his work until his latest illness. Earnest L. Bingham was born at Oil City, Penn., May 31, 1886. He came to Nevada in 1875 and resided in Cornucopia and Tuscarora until 1900.

WASHINGTON.

Harold Little, a prospector of the Coeur d'Alenes, has purchased a home at Dishman, a few miles from the city limits of Spokane, Wash., and has retired from mining with a fortune estimated between \$75,000 and \$100,000, all made in the past three years.

Operations have been resumed on that part of the Old Dominion mine, near Colville, where silver ore of high grade was struck some time ago. An announcement from the mine was to the effect that a drift had followed the ore for 4 feet and that its width was greater at the face than at the point of intersection. At the place of discovery the ore had a width of nearly three feet and a metallic content that averaged \$1140 to the ton. This was at a depth of more than 700 feet on the dip of the vein, and at a point 200 feet from the portal of the tunnel. Work was discontinued in September to permit the installation of a ventilating system and other equipment. This has been completed. Operations are proceeding under the direction of V. H. Linney, president and general manager of the Dominion Silver-Lead Company, owner of the property and resident of Spokane.

Coal Notes

H. E. Lewis, general manager of the Standard Coal Company was a guest at the Savoy. His company, he states, is preparing for its biggest output of coal this winter. The coast orders are coming in regularly and in large volume.—*Price Advocate*.

G. M. Russell, of Cokeville, Wyoming, was in Kemmerer a few days ago on business connected with a coal mining enterprise in which he is interested. He and his associates are negotiating with a Salt Lake and San Francisco syndicate of capitalists, with a view to leasing the property.

A hearing on a contest of the state of Utah and the Pleasant Valley Coal company against Lewis A. Lawyer was held before Register Gould B. Blakely of the Salt Lake land office. The case involves a forty-acre tract in the vicinity of Castle Dale, which was acquired as nonmineral land by the coal company from the state. Lawyer filed on the tract as being of mineral character in 1919. The question now is whether the land contained known coal deposits when Utah was admitted as a state and was given its pro rata of public lands. The tract is valued at \$4000.

Petroleum Notes

By subscribing \$30,000, the citizens of Miles City, have made it possible for the Miles City Oil Refining Co. to complete its plant in that town. The citizens of the place had previously subscribed \$60,000.

The Prairie Gas and Oil Company on the 7th announced an increase in the price of Oklahoma, Kansas and Texas oil. Oklahoma and Kansas oil was advanced to \$2 a barrel. North and Central Texas oil went to \$2.25.

The board of directors has decided to hold the second annual meeting of American Petroleum Institute at the Congress Hotel in Chicago, Dec. 6, 7 and 8. A full program will be announced later. Kansas City was a candidate for the meeting.

Bringing in a second gas well by the Fargo Oil Company in the Casper, Wyo., field, within a week, adding a total of 29,000,000 cubic feet of gas daily to the company's output, is a record that was reported to Vice President Ben Hunsaker in Ogden.

A party of Salt Lake City capitalists and mining men have been here on a tour of inspection of the De Beque shale fields. The members of the party were; Preston Cannon, A. T. Folger, Thomas Buzzo, and J. B. Jensen, prominent mining engineer.—*De Beque Shale News*.

At a depth of only 160 feet, a considerable flow of gas has been encountered in the well being put down by the Arizona-Utah Gas & Oil Company, near Cisco, Utah. Frank Elison, driller in charge, is passing today in this city. He reported the flow of gas and stated that indications of oil are already strong.—*Grand Junction Sentinel*, 3d.

Drilling is being continued at the Virgin Dome oil well with very encouraging indications. The impression seems to be general that the drill is in oil right now. Supt. Hailer is expected in from San Jose, Calif., very soon and when he arrives it is the intention to resume working two towers.—*Washington County News*, 3d.

The United States must have gasoline for 8,500,000 automobiles and trucks, and for tractors, stationary engines, and motor boats so numerous that they bring the total to 10,000,000. These figures do not include needs of the navy, army, and marine, nor of other industries. Yet Americans control but 18 per cent of the oil still stored in the earth.

Official announcement has been made by the Tonopah Mining Co. of the organization of the Imperial Fish Lake Valley Oil Co., composed of officials of the mining company and the Tonopah & Garfield Railroad Co., to drill for oil in Fish Lake valley, where 2560 acres of land has been acquired. The decision to seek oil in Fish Lake valley was made after a thorough study of the locality by oil geologists.

In the Summit Point neighborhood in San Juan county oil locators have become so numerous that homesteaders have sought the advice of the land office as to whether their farm holdings had the preference over oil fields. The farmers have been notified that all oil locations covering homesteads have been suspended and that homesteads have the prior claim to the land.

More extensive showings of oil and an increasing gas pressure in the well being drilled by the Union Consolidated Oil company in the Big Piney district of Lincoln county, Wyo., are reported by E. H. Dickensheet and R. E. Grove of that company upon their return from the field recently. They reported that the well was down 1215 feet and that the drill was in a hard shale and which the driller confidently expected was the caprock.

The Monumental Oil Company, Perry A. Clark, manager, operating in southern San Juan county, has spotted the location for the new test well to be drilled. This com-

pany will drill this hole with a standard rig, which has been ordered. The Columbia rig is being taken to the Hulkito structure, where an effort will be made to reach the Honaker sands underlying at a depth of 1600 feet, according to the estimates of geologists.

The oil industry lost a golden opportunity to carry on during the railroad strike. It was all set for it, when the strike bubble burst, says the Oil and Gas Journal. Millions of trucks and automobiles in the United States would have been put into instant service, and while it may not have resulted in business as usual, the two industries—petroleum and automobile—would have gone far to relieve a very serious situation.

Work has been resumed on the Green River Petroleum company's well in the lower La Barge field, Wyoming, about forty miles from Kemmerer, under the direction of W. D. Newlon, who has had charge of the field work for this company the last two years. Every evidence of the disastrous fire, which on the evening of October 1 destroyed the standard rig, casing and machinery and equipment to the value of \$40,000, has been removed, and a Star rig, capable of reaching a depth of 3000 feet, placed over the hole, which had reached a depth of 1500 feet at the time of the fire.

Trade Notes

The Helper Coal Co., W. A. Williams general manager, is equipping the property in Hardscrabble canyon, with Sullivan undercutter coal mining machines. A one and three quarter mile power line is also being constructed to the property.

Stanley S. Stevens, factory representative of the Byron-Jackson Iron Works Co. announces the removal of the company's Salt Lake headquarters from the American building to 134 W. Second South street, where a complete line of centrifugal and turbine pumps will be carried in stock for irrigation, reclamation, boiler feed, mines, sugar mills, water works, etc.

W. F. Hayden, chief engineer of the Caribou Placer company, was in Salt Lake City early in the month on a short business trip. The Caribou Placer company, financed by Pittsburg interests, is developing a large acreage in Bonneville county, Idaho, near Soda Springs. Equipment of the property for operation in the spring is proceeding steadily.

James A. Hogle & Co., brokers, bond and securities dealers of this city and Ogden, enlarged its field of operations yesterday by opening a branch house at Pocatello, Idaho. J. C. Clark, well known Oregon Short Line official here for several years, is manager of the Pocatello house. The entry of this reliable house into the business activities of the lively Idaho burg will add materially to Pocatello's metropolitan standing and afford its investors and market patrons all of the advantages of big city connections.

The American Turpentine & Tar Co., of New Orleans, La., has just issued a pamphlet descriptive of its line of destructively distilled pine flotation oils. Since Frank E. Mariner became vice-president of this company a few months ago, the production of various grades of pine flotation oils is being featured. Mr. Mariner is known throughout the mining regions of the country wherever the flotation process of ore treatment is employed and he knows just what is needed in oils to make the process yield best results.

Personal Mention

W. O. Jackson, of Butte, Montana, has been inspecting mining properties in the Prescott district.

Earl T. Godbe has moved from Pioche to Cherry Creek, Nevada.

J. W. Cairns, well known mining operator, was called to Weimar, California, on the 3d, owing to the serious illness of his son-in-law.

John C. Febles has been appointed general superintendent of the Boston & Montana Development Company's properties at Wise River, Montana.

E. P. Mathewson has been appointed consulting engineer to the Burma Mines, Ltd., and is on his way to the company's properties via London and Marseilles.

Kirby Thomas has completed an examination of gold properties in the Caribou Mountain District north of Soda Springs, Idaho.

B. B. Thayer, vice-president of the Anaconda Copper Mining Co., was a recent visitor in Butte inspecting the company's properties. He also visited the phosphate deposits of the Anaconda at Soda Springs, Idaho.

J. A. Starbuck, of San Francisco, who has been in Salt Lake in connection with the financing of some of the new coal companies, has returned to the coast much impressed with the outlook for and stability of the coal mining industry in Utah.

Charles Peter, president and general manager of the Mascot Consolidated Mining Company, returned from a three weeks' business trip to New York a few days ago. He is now on his way to the company's mines in Idaho, where everything is being placed in apple-pie order for a winter's vigorous campaign of development.

S. M. Soupcoff, field engineer for the American Smelting & Refining Company, has returned from a visit to Colorado mining camps. The metal industry in Colorado is suffering from an extreme depression, which is reflected by every other business, Mr. Soupcoff said. At Telluride, however, there is considerable activity, as a number of the mines are operating at capacity.

CREDIT WHERE CREDIT IS DUE

Gentlemen: In your October 30th issue, you note that Mr. E. Katsumata, chief engineer of the Mitsubishi Company, Tokyo, Japan, was in Utah. In this article you do an injustice to the Goodman Manufacturing Company, whose machines Mr. Katsumata has purchased, and which machines will be used in the Japanese mines under him. Mr. Katsumata was the guest of the Goodman Manufacturing Company on his trip West. I trust you will note this correction and remain, yours truly,

LINDROOT, SHUBART & CO.,
By Benedict Schubart.

Denver, Colo., Oct. 31.

Certainly the Mining Review had no thought of doing an injustice to the Goodman company, or to its Western representative, the Lindrooth, Shubart Co., in making personal mention of Mr. Katsumata's visit to Utah. The gentleman was here for a week. He was met upon his arrival in Salt Lake by Mr. B. B. Brewster, western representative of the Sullivan Machinery Co., and D. S. Allison, field man for the Sullivan company was with him for nearly a week in the Carbon county coal fields. "Mr. Katsumata, himself, told us," Mr. Brewster states, "that two Sullivan coal cutting machines were on the way to his properties in Japan."

METAL MARKET QUOTATIONS, NOVEMBER 10th.

Silver	.....	99 1/4c.
Silver in London	.....	39d
Copper	.....	12 1/2 @ 13 1/4c.
Lead	.....	\$4.70
Zinc	.....	\$4.75

CHIEF CON. DIVIDEND CHECKS ACCOMPANIED BY QUARTERLY REPORT.

Accompanying dividend checks for the third quarterly distribution on the first of the month the Chief Consolidated Mining Company also issued a report covering the quarter's operations. The dividend disbursed was for 5c. a share and aggregated \$44,201.10, making a total of \$176,044.40 paid during the present year, and \$2,004,323.07 total to date. Net profits for the quarter totaled \$72,939.66. The metal production for the quarter consisted of 735,922.92 ounces of silver, 1142.153 ounces of gold, 3,270,749 pounds of lead and 3,082 pounds of copper.

According to the report issued the metallic contents of the ore shipped, according to assay, were as follows per ton: Gold, .0584 ozs.; silver, 33.276 ozs.; lead, 16.55 per cent; copper, 1.10 per cent. The average gross value per ton of all ores was \$40.69. Smeltings, freight and sampling charges per ton was \$18.55 per ton, which brought the average net value to \$22.14 per ton.

Walter Fitch, Sr., president of the company, in his report states that the mine continues to give quite remarkable results and that were it not for the doubled cost of freight and treatment much better returns could be made to stockholders. One slight freight reduction has been made recently, and there is promise of another reduction, if the railroads can succeed in their own efforts for adjustments, according to Mr. Fitch.

General Manager Cecil Fitch in his report explains that compared with the previous quarter, the general analysis compares closely in all respects, with the exception of the lead ores, which show a slightly lower grade, but a 57 per cent increase in the tonnage of this product. In the area contiguous to No. 2 shaft, Mr. Fitch says, one of the ore bodies mentioned in the previous report has improved in grade and is demonstrating permanency.

According to the report of Superintendent J. Fred Johnson, during the third quarter of the year a total of 1,654 feet of development work was done in the Chief mine and 160 feet in the Plutus. The total shipments were 22,116 tons of dry ore yielding after smelting, transportation and sampling charges, \$489,534.45.

The assets of the company are listed upon the balance sheet of September 30, 1921, as being: Property, \$2,011,752; mine investments, \$346,796.21; current assets, \$46,182.46; Liberty bond investments, \$648,607.97; and cash, \$89,058.40, making a total of \$3,359,882.53.

Liabilities are given as follows: Capital stock, \$883,200; surplus, \$1,682,200.84; bills payable, \$20,000; current liabilities, \$133,016.51; reserve accounts, \$640,633.18. Total, \$3,359,882.53.

NEW GOLD PLACER DIGGINGS NORTHEAST OF MOSCOW, IDAHO.

At the east end of Moscow mountain, ten miles northwest of Moscow, Latah county, Idaho, and just north of Old Butte, placer mining is being carried on in a newly discovered district and indications are that the district will develop to a point which will rival the Hoodoos and the Pierce City district, in the early days of western placer mining.

The placer prospect is on the homestead of George Brad of Troy and the pay dirt was discovered last summer by Ed. Williams, an old-time prospector, who prospected in that region, believing that if there was gold in the old Hoodoo district, in the northern part of the country, the Moscow mountain, with the same formation, would contain mineral.

At the head of Hatter Creek, on the east slope of the

mountain, he discovered indications that interested him, and after several month's work, which convinced him that he had struck a paying placer, he went to Saad, the owner of the land, and told him his story. Saad gave him a lease on 40 acres of the land and he, with several other men, has been working continuously since.

Five shafts were sunk and dirt panned from these shafts went from 15 cents to 55 cents to the pan. Black sand yielded \$5.80 to the ton when washed. A flume is being put in and 700 feet of 10-inch pipe has been purchased and is on the ground. The fall and winter will be devoted to preparing to sluice the dirt next spring, when the first high water comes.

NEW MEN AT EUREKA-CROESUS HELM.

According to recent advices from Eureka, Nevada, there has been a general shaking up in the official household of the Eureka-Croesus Mining Company. The new status of affairs is given authenticity through a statement issued from mine headquarters, as follows:

Messrs. H. Carleton Slack, Walter Slack, O. H. Evans and C. N. Sigison have retired from the board of directors and the following have been elected:

S. Russell Smith, mining engineer of Calumet, Michigan, vice-president and director.

George P. Hyde, metallurgist of Detroit, Michigan, secretary-treasurer and director.

Dr. Walter Harvey Weed, geologist of New York, director.

A. P. Entenza, lawyer of Detroit, Michigan, director.

Frank L. Torres of New York continues as president and director.

John D. Peckner has resigned as secretary and treasurer.

H. G. Catlin has resigned as consulting engineer.

The new management has instituted a policy of intensive development at the mine, and the new working shaft from the 400 foot level is now 210 feet down and is approaching the ore bodies under the large stopes in the Atlas ground. It is proposed to sink this shaft to a depth of 600 feet from the 400-foot level.

FLOTATION INVESTIGATIONS IN IDAHO.

Zinc-lead flotation investigations are among the most important lines of work being done by the bureau of mines and geology of Idaho, according to reports recently issued from the University of Idaho mines bureau, at Moscow. The zinc-lead ores of the Coeur d'Alenes will be of great value if a satisfactory process of separation is found.

The Bunker Hill smelter management has been making investigation for some time and has decided that it has a process that will handle the ores and it is contemplating a million-dollar plant to treat such ores.

Investigation of the ores of the Pen d'Oreille district show that while the ore is decidedly complex and a selective scheme of concentration would be desirable for the elimination of the zinc and iron, those metals carry too much silver to warrant discarding them.

WANTED—Superintendent, by Contracting Company doing a large amount of shaft sinking in the bituminous coal fields east of Ohio river. Requirements: Man of sufficient ability to take entire charge of erecting sinking plant, rock work, and lining shaft with concrete. State age, experience and salary wanted. Address The Dravo Contracting Company, Pittsburgh, Pa.

SALT LAKE MINING STOCK QUOTATIONS

The range of the market from October 25th, 1921, to November 10th, inclusive. Quotations furnished by J. A. Hogle & Co., direct wires to all leading markets, 169 So. Main St., Salt Lake City, Utah, and ground floor of Eccles Building, Ogden, Utah.

CLOSING								CLOSING							
Stock.	Open.	High.	Low.	L. S.	Bid.	Asked.	Sales.	Stock.	Open.	High.	Low.	L. S.	Bid.	Asked.	Sales.
Antelope Star						.03		Kennebec	.05	.05	.05	.05			50
Alta Con.						.01		Lehi Tin.	.01	.01	.01	.01		.01	40,00
Alta Tiger						.01	4,000	Leonora	.02	.02	.01	.01		.01	30,00
Albion Cons.	.06	.06	.05	.06	.05		10,300	Logger	.01	.01	.01	.01		.01	2,00
Am. Con. Cop.	.01	.01	.01	.01	.01	.02	16,000	Lynn Big Six							
Alta Tun.	.10	.14	.10	.13	.12	.13	75,400	Monzonite						.01	
Bell Silver	.52	.55	.50	.54	.53	.55	4,300	Miller Hill						.01	
Bullion					.02	.05		May Day						.01	
Big Hill	.01	.01	.01	.01	.01	.03	1,000	Moscow						.10	
Big Cot. Coal.	.04	.04	.04	.04	.03	.04	3,000	Mich. Utah	.05	.07	.05	.07		.08	55,00
Beaver Cop.	.01	.01	.01	.01		.01	6,400	New Quincy	.08	.08	.06	.07		.07	64,55
Bay State	.02	.02	.02	.02		.07	1,000	Naildriver						.07	
Black Metal	.06	.10	.06	.10	.09	.12	3,260	No. Standard	.02	.02	.01	.01		.01	
Bingham Gal.	.07	.09	.06	.06	.06	.06	181,500	O. K. Silver	.01	.01				.02	23,60
Cent. Eureka						.02	500	Opohongo							5,00
Colb Rexall.	.14	.15	.14	.14	.14	.16	3,200	Ohio Copper						.50	
Colo. Con.	.02	.02	.01	.01	.01	.03	1,100	Plutus						.18	
Crown Point	.03	.03	.02	.02		.02	2,175	Prince Con.	.07	.07	.07	.07		.05	1,20
Cardiff	1.05	1.05	1.00	1.00	.90	1.00	300	Paloma							3,00
Croff								Pioche Brist.							5,00
Cott. King						.01		Prince Mng.	.03	.06	.03	.04		.04	21,50
Cott. Metals						.01		Provo	.01	.01		.01		.01	5,00
Daly					1.00	3.00		Reeds Pk. C.							.02
Daly West					1.00	3.00		So. Standard	.12	.12	.12	.12		.12	1,20
Dragon						.10		Sells	.02	.03	.02	.02		.02	4,20
Demijohn C.						.01		Syndicate							
Emma Silver							10,000	Sil. King C.	2.10	2.10	2.05	2.05	2.05	2.10	2,40
Empire Mns.						.04		Sil. King Con.	.66	.70	.60	.65	.63	.68	5,30
Emerald					.01			Sioux Mns.	.01	.01	.01	.01		.02	1,00
Eureka Mns.	.04	.04	.04	.04	.03	.04	3,000	Swansea Con.					.01	.03	
E. Crown Pt.	.02	.02	.02	.02	.02	.02	13,500	So. Hecla					.20	.50	
E. Tin. Coal.							7,000	Silver Shield	.06	.07	.06	.06		.05	7,00
East Tin. C.						.09		Tar Baby	.03	.03	.02	.03		.03	26,00
Eureka Lily	.09	.09	.08	.08	.07	.08	10,000	Tintic Cent.	.01	.01	.01	.01		.01	1,00
Eureka Bul.	.04	.05	.04	.05	.04	.05	17,450	Tin. Stand.	1.85	2.00	1.85	2.00	1.95	2.00	5,10
Eureka Mns.	.02	.02	.01	.01			2,000	Uncle Sam							1,00
Grand Cent.					.10	.35		Utah Con.							40
Hambg. Mns.								Union Chief					.01	.03	
Howell	.06	.06	.06	.06	.05	.06	13,700	Victor Mng.					.01	.02	
Home Run								West Toledo	.02	.03	.02	.02		.02	14,00
Iron Blossom	.13	.15	.12	.15	.15	.17	4,225	Walker Mng.	2.50	2.50	2.50	2.50	2.40	2.75	2
Indian Queen								Woodlawn	.07	.07	.06	.06		.06	3,30
Iron King	.06	.06	.06	.06	.05	.06	3,000	Yankee Con.					.01		
Judge M. S.					2.00			Zuma	.05	.05	.05	.05	.03	.04	1,00
Keystone					.10	1.00									

ORE SHIPMENTS

Production and shipments of ore from the Tintic district during the two-week period ending on the 11th amounted to 359 carloads, aggregating 17,950 tons, as follows:

Tintic Standard	147
Chief Consolidated	87
Dragon Consolidated	24
Victoria	26
Eagle & Blue Bell	19
Iron Blossom	18
Centennial-Eureka	6
Colorado Consolidated	9
Swansea Consolidated	11
Empire Mines	3
Gemini	2
Eureka Mines	1
Bullion-Beck	2
Alaska	2
Sunbeam	1
Tintic Drain Tunnel	1

Total carloads 359

During the same period the mines of Park City shipped a total of 4,219 tons of ore, of an estimated value of \$150,000, as follows:

Judge Allied Companies	1,870
Silver King Coalition	1,290
Ontario Silver	909
New Quincy	50

Total tons 4,219

ASSESSMENTS PENDING

Bullion Coalition, 2c. a share. Delinquent December 3. Sale day December 27.
 Bingham-Tooele, 3 mills a share. Delinquent December 6. Sale day January 5.
 Cottonwood Metals Mining Company, 1c. a share. Delinquent November 28. Sale day December 20.
 Austin Mining Company, 1c. a share. Delinquent December 1. Sale day December 22.
 Emma Silver Mines Company, 1/4c. a share. Delinquent November 30. Sale day December 15.
 Woodlawn Mining Company, 1c. a share. Delinquent November 26. Sale day December 15.
 Whirlwind Mining Company, 3 mills a share. Delinquent November 15. Sale day December 10.
 Cottonwood King, 1/4c. a share. Delinquent December 3. Sale day December 24.
 Emerald Mining Company, 1c. a share. Delinquent December 15. Sale day January 14.
 Revelator Mining Company, 1/4c. a share. Delinquent December 5. Sale day December 28.

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The Salt Lake Mining Review

VOL. 23 NO. 16

SALT LAKE CITY, UTAH, NOVEMBER, 30 1921

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Methods of Mining at the Highland Boy Mine of the Utah Consolidated, Bingham, Utah

By A. S. Winther, E. M. *

The Highland Boy mine, owned by the Utah Consolidated Mining Company, is situated in Bingham, Utah, at the head of Carr Fork Canyon. The mine has been in operation since 1896 and has produced notable amounts of copper and lead. The normal output is 700 to 1000 tons per day of copper ore which is a heavy sulphide, direct smelting ore; an aerial tramway, four miles in length, affords transportation to the International smelter at Tooele, Utah.

Geology and Ore Occurrence

A brief description of the geology and manner of ore occurrence in this portion of the district will give a better understanding of the conditions under which the mine is worked.

The Highland Boy limestone in which the ore occurs is the largest of a series of alternating beds of limestone and quartzite which dip 25 degrees to the north within which occur intrusions of monzonite porphyry along the strike faults. This limestone is approximately 350 feet thick. The ore bodies, being replacements of the limestone, occur in varying sizes and shapes from small stringers to large irregular bodies, generally conforming with the dip of the limestone and the greater horizontal dimension being in the direction of the strike of the beds. Some of these ore-bodies have extended several hundred feet on the dip and have been 200 feet wide by 300 feet along the strike.

The copper ore is composed chiefly of the sulphides of iron and copper and is generally compact and heavy; although quite hard and firm, the ore is rather blocky, due to small fissures and gouge seams which pass through the ore in all directions and in great numbers; there is practically no adhesion between the ore and the limestone hanging wall. As a result the ore becomes very heavy, when undercut to any considerable extent.

Due to the irregularity of the occurrence of the ore bodies the exploration workings can not be laid out in advance on any definite plans but are driven in ore when possible or follow favorable indications or are driven through the limestone in search of ore. As these drifts are later used as the avenues through which the ore is extracted, the method of stoping is somewhat affected by their location. A great deal of exploration work is done from the different floors of stopes rather than on the main levels, because the waste therefrom is easily disposed of and incidentally provides filling for the stopes. The extent and general limits of the ore body are

determined in the usual manner by crosscuts, drifts and raises.

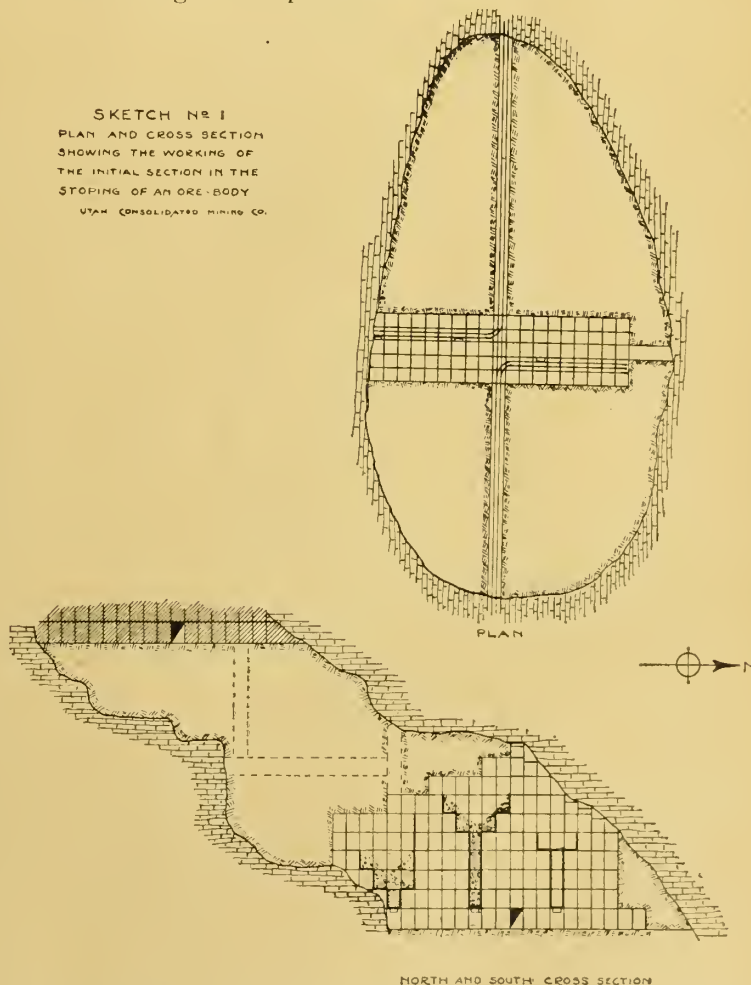
Method of Mining.

The method of mining employed consists of overhead square-set stoping and subsequent filling.

The reasons for using the square-set method are:

1. The general dip of the ore bodies conforms with that of

SKETCH NO. 1
PLAN AND CROSS SECTION
SHOWING THE WORKING OF
THE INITIAL SECTION IN THE
STOPING OF AN ORE-BODY
UTAH CONSOLIDATED MINING CO.



NORTH AND SOUTH CROSS SECTION

the limestone formation, approximately 25 degrees, which inclination is too low to permit the broken ore to run, thus preventing the use of one of the shrinkage methods.

2. The ore is too blocky and fissured and with too many talc and gouge seams, necessitating timber supports, to permit the extraction by the back-filling method.

3. The boundaries of the ore body are irregular, requiring

*Superintendent of the Highland Boy Mine. Paper read at the Utah Metal Mine Operators Institute, Salt Lake City, October 7-8, 1921.

a flexible method of mining to insure total extraction of the ore.

4. In many portions of the mine it is necessary to prevent the surface from caving on account of the buildings, surface drainage, etc.

5. Some of the softer ore bodies do not stand well, requiring close timbering; these stopes also have a soft porphyry hanging-wall which becomes quite heavy.

6. The limestone hanging-wall, although very hard, slacks off in large slabs within a comparatively short time after being exposed to the air.

The size and shape of the ore body having been roughly determined by the exploration drifts, crosscuts, and raises the following general method of stoping is carried out.

The entire ore body is stoped out by a series of parallel panels or sections. These panel stopes are in reality cross-section stopes extending from foot-wall to hanging-wall and up to the sills of the stopes on the level above or to the hanging wall, as the case may be. The initial section is usually located

mined and filled, panel 3 almost mined out and panel 4 just started.

These operations are repeated until the entire ore body has been mined out. In the case of very large ore bodies, stoping from the level below can be started under the filled portion above before all the ore on either side has been extracted.

As the ore is generally quite heavy and the hanging-wall firm, the sill floor is not completed before mining is commenced overhead, but is kept slightly ahead of the sets above; the idea being to have as little ore undercut as possible up to the hanging-wall or to the sills of the stope above, thus avoiding the great pressure of the overlying ore on the square sets.

No attempt is made to locate the sets of a stope directly below the sets of a filled stope above. The panels are quite narrow and the weight from the filled stopes above is never very great. Leyner machines are used in cutting out the sill floor and silling on the upper floors; stopers are used in all overhead work. Recent tests with wet self-rotating stopers have shown very remarkable results as compared with the dry stopers.

Square Setting Chute Instalation, Etc.

The square sets used are 5'x5'x7" centers and consist of 9"x10" posts, 10"x10" and 6"x10" braces. Details of framing are shown in sketch (4). Caps are placed at right angles to the longer dimensions of the stope to withstand the side pressure from the filled portion of the stope on one side; the end weight which is caused by the hanging-wall is not great and is easily supported by the 6"x10" braces.

Ore chutes are spaced 30 feet apart along a track running the full length of the panel on the sill floor. These chutes are widened in both directions above the second floor so that a large portion of the ore broken falls directly into the chutes and the remainder is shoveled a short distance only.

As the inclination of the foot-wall is quite flat it is generally necessary to handle that portion of the ore in cars on a track laid on the 6th or 7th floor, over one of the lower chutes. Heavy "blasting timbers" either 6"x10" or 10"x10" are placed on the floor to protect the square sets while blasting. They cover only those sets upon which the ore will fall and are moved about as needed. They are later replaced by 2"x12"x5' flooring.

When the ore in any panel or section has been extracted the floors are all taken out and the panel made ready for refilling. The sill floor is covered with one thickness of 2"x12"x5' lagging to prevent the waste rock from running when a stope from below breaks up under the sills. The section is then laced on the side next to the ore with 2"x6"x5' lacing spread 3' apart.

It is customary to leave one or two sets open (see "B" in sketch No. 2) on the side next to the ore to serve as a manway to the level above, for convenience in attacking the next panel and for ventilation.

The only permanent passageway kept open through the filled stopes is the main haulage drift. The filling over this drift become very heavy for a time but later sets and gives little trouble; a few reinforcing timbers usually suffice; if not, one retimbering of the drift is sufficient. Bridge work above the drift caps and outside of the drift posts is put in before filling is commenced, which allows for considerable settling of the waste and protects the drift sets for some time, also makes the retimbering much easier.

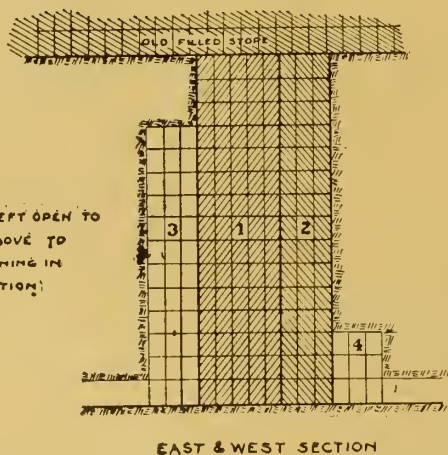
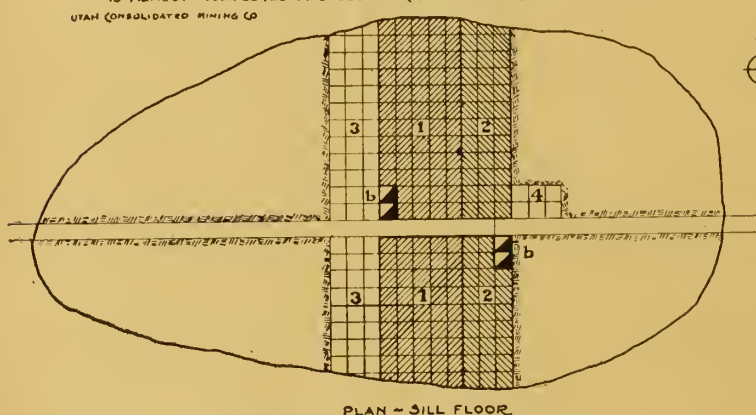
Handling of Waste Rock.

Waste for filling is trammed on the level above and dumped into the open section until the top of the waste pile is up to the track level. A large portion of the stope under the hanging-wall still remains unfilled (See sketch No. 3) so

SKETCH No. 2.

PLAN AND CROSS-SECTION SHOWING STOPING METHOD
SECTIONS (1) AND (2) HAVE BEEN MINED OUT AND FILLED. SECTION (3)
IS ALMOST COMPLETED AND SECTION (4) HAS JUST BEEN COMMENCED.

UTAH CONSOLIDATED MINING CO.



"b" 2 SETS LEFT OPEN TO
NEXT LEVEL ABOVE TO
FACILITATE MINING IN
ADJOINING SECTION;

near the middle of the ore body and varies in width from two to six sets, depending upon the firmness of the ore; this section is mined out from foot-wall to hanging-wall.

Sketch No. 1 shows, in plan and section, the initial panel partially worked out. This panel will include all of the ore (A) up to the sills of the stope above.

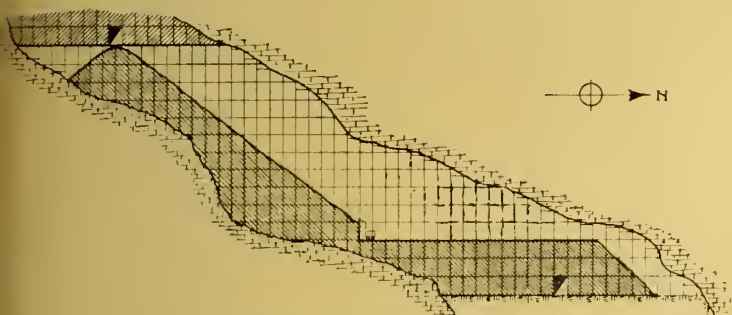
When the initial section has been completely mined out it is filled with waste and an adjoining section 2 to 4 sets wide is started on one side. When the second section is worked up to the level above it is also filled and a third section is started on the opposite side of the initial section. After the first two panels have been mined and filled stopes on both sides may be worked simultaneously.

Sketch No. 2 shows, in plan and section, panels 1 and 2

cheap chute mouth is built at the edge of the waste slope a few floors above the sill floor, a temporary track is laid out to the hanging-wall and the waste is again trammed and dumped. When the waste track has reached to top floor it then becomes necessary to bank or shovel the waste filling tight under the sills or the hanging-wall.

A stream of water is kept running over the waste pile as filling progresses; this causes the filling to pack well and cement together to a certain extent reducing the tendency of the filling to run while mining alongside of a filled stope.

SKETCH NO 3
CROSS SECTION SHOWING METHOD OF FILLING STOPE WHEN
WORKED OUT
UTAH CONSOLIDATED MINING CO.



or when coming up under the sill of a filled stope. Generally stopes filled in this manner cause very little side or downward pressure, provided they are not kept open too long.

Waste rock is drawn from a vertical raise, which extends from the lower levels to the surface, about 450 feet at that point, with which there are connections on each level. Waste from exploration workings which must be hoisted is trammed, through a connection on the main tunnel level, to this chute and dumped into it. In case there is not enough waste from exploration workings to fill the stopes enough more is glory-holed into the chute from the surface.

It has been found necessary to use a waste filling with very little sulphides in it, on account of the tendency of the sulphides to heat badly, due to the oxidation of the sulphur. All the waste obtained from exploration workings carrying any considerable amount of sulphides is hoisted to the surface and run out over the dump. It has been necessary in several instances to remove two or three thousand tons of waste rock containing a large amount of sulphides, which had been sorted out of the ore and thrown into the lower sets as filling. This material heated to such an extent that the timbers were charred and would have developed into a serious mine fire in a very short time.

Variations in Mining Methods, Costs, Etc.

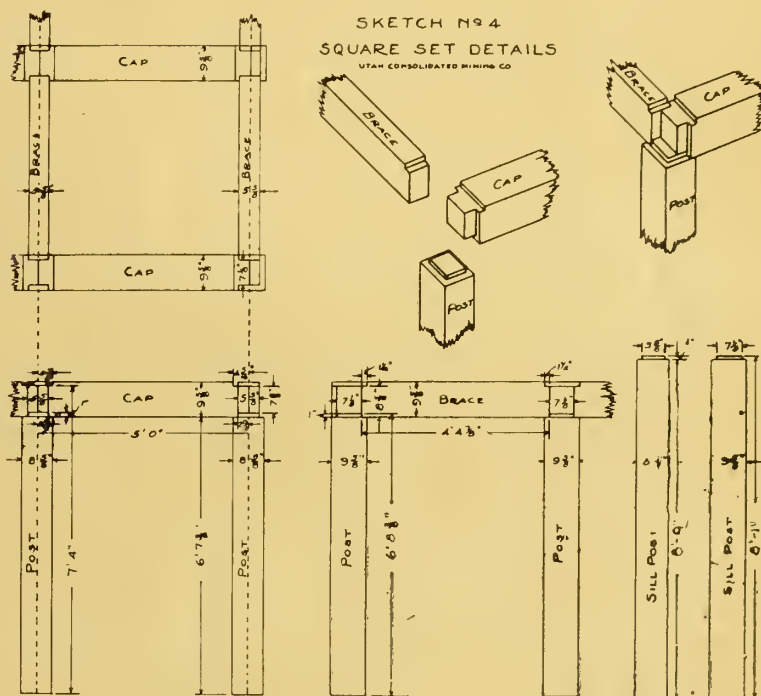
The details of mining different ore bodies vary somewhat but in general the above methods of mining and filling are followed. If at any time, as frequently happens, a stope only partially worked out begins to show weight, to any extent, the mining operation is stopped and a portion of the stope in which the mining is completed is filled and then the remainder of the panel is mined out. This is done rather than to attempt to hold open the entire stope by reinforcing timbers until entirely worked out. The method of mining is quite flexible and can be made to conform to any local conditions existing in the different ore bodies.

The same general method, with slight variations, has been employed in the extraction of old pillars and caves in the old part of the mine with very good results.

One detail, which might be mentioned, is that in filling high stopes the timbers settle away from the back, due to the

weight of the filling, and it is advisable to have timbermen frequently tighten up the wedges under the hanging-wall and sills or there may be a space of a foot to eighteen inches between the ground and the top set and considerable buckling of sets will result, with the possible caving of the stope.

In this method of mining no pillars are left nor are there any portion of the ore-body left to be mined which will become difficult of extraction. Generally speaking there are no stopes which become very heavy during operation; consequently there is no need for doubling-up sets, angle-braces, timber-bulkheads, etc., which are commonly used to keep large stopes open when they become heavy. There is complete extraction of the ore. Good ventilation is easily maintained. Large caves, with their accompanying dangers to the workmen and subsequent dangers of mine fires are avoided.



A system of contract mining and filling the square-set stopes has been employed satisfactorily for several years, the prices paid varying according to the character of the ground, length of tram, the scale of wages, etc.

The ore is hoisted to the main tunnel level in four ton skips and is then trammed to the headhouse of the aerial tramway in trains of eight-ton cars drawn by a six-ton electric locomotive. On most of the lower levels the ore is trammed to the shaft by hand but the lowest level is equipped with electric haulage and handles the ore from the bottom two or three levels.

The actual stoping cost in 1916 was \$1.20 per ton and the filling cost was \$0.15 per ton. In 1919 the costs increased to, stoping \$2.20 per ton and filling \$0.30 per ton.

The method of mining described is employed in the extraction of the ore from the large, regular replacement bodies. In the mining of a more regular, narrow deposit, of a width from 2 to 8 feet, with nearly vertical walls a system of rill stoping has been started, but as yet is not so thoroughly tried out as to warrant a description of its operation.

THE OIL PROBLEM IN THE UINTA BASIN, UTAH

By Prof. Earl Douglass*

To show some of the unusual and interesting features of the Uinta Basin, I submitted to the Mining Review some time ago a series of articles in story form, entitled, "A Trip through the Uinta Basin." It represented only a beginning and showed but a small part of what such a trip for pleasures and study might be. We had begun to unravel and trace out the solution of a puzzle which of itself was fascinating, but it involved matters of such timely economic importance as well as purely scientific interest that it resolved itself into a great problem worthy of the most careful, painstaking and extended observation and study.

For various reasons a good deal of interest was aroused and the search for data took me out into the field so much of the time that I had little time for writing, but it gave the opportunity to follow up the quest until it had become one of the most fascinating geological problems which I have ever encountered. Though the task is no small one, and only a part of the preliminary reconnaissance work has been done, the conditions are such that it is none too early I am sure to collect, arrange and record the facts for the benefit of other investigators and for this purpose, as brevity and clear statements of facts are needed, the story form seems hardly suited.

I think I do not need to offer excuses for beginning these articles at this time, yet I am sure they will be more clearly understood and will be more effective if some of the reasons for writing them are briefly stated:

First Entered the Field in 1908

(1.) After conducting a series of hunting expeditions in Montana and North Dakota for the recovery of the remains of previously unknown plants and animals from the rocks of the various geological ages, and making a special study of the earliest and later Tertiary deposits there, I came in 1908, to do similar work in the lower Tertiary deposits in northeastern Utah where several expeditions from Princeton University and from the American Museum of Natural History of New York City, had collected extinct mammals unknown elsewhere. So far as the extensive Tertiary deposits were concerned it was geologically and geographically, as it still is, a little known land. Little geological work of a detailed nature had been done except by those who had been here in search of the unique mammalian remains. The Basin had already become renowned however for one other distinctive peculiarity—the occurrence of great dikes of hydrocarbons such as gilsonite, elaterite, etc.

The remains of unfamiliar animal life and the composition and structure of the deposits in which they were imbedded gave us dim hazy glimpses, as through the rifted clouds, of lands and times of which there were no written records, but the huge vein of pure black shining gilsonite deposited between straight perpendicular walls of rock, which had the appearance of having been gashed with an immense knife, seemed to be, at first sight, one of those mysteries of nature of which there is no solution.

The writer has wished, at some future time, to write a memoir on the geology and geological history of the Uinta Basin, but at every excursion the task seems greater, and to solve the larger problems, question after question arises for solution. Nearly everywhere one goes the unparalleled showings of oil and oil residue bring him face to face with the alluring oil-problem in all its phases, for the ghosts of that modern Sphinx seem to stare at him wherever he goes.

*Geologist, Jensen, Utah, for several years engaged in exploratory work in the Uinta Basin country.

(2.) I am excusable then, even though I am not classed among "oil-geologists," in attacking, or at least not ignoring, the oil-problem which, whatever it may be in other fields, is here a strictly geological one. To make this truth clear is one of the objects of these articles. It is true that certain questions as to the amount of oil, the water line, etc., will need the service of the drill but the geologist should do careful detailed work ahead of it and guide its use.

(3.) There are still open and unsettled questions as to the origin, migration and concentration of petroleum. In the Uinta Basin nearly every phase is open for investigation, and it seems that a careful study of conditions here ought to help settle many doubtful questions. How oil does actually behave is of more practical interest than how it might behave under certain hypothetical conditions.

(4.) The present conditions are such that the discovery of oil has assumed not only national but international importance. Prospects of new producing fields should therefore arouse unusual interest.

Facts Must Supplement Rumors and Assertions.

(5.) We have become quite accustomed to statements similar to the following: The largest efficient telescope lens has been made; inventions have nearly reached their climax; the last great oilfield has been opened, etc. A few days ago a lady was reading a statement of a great physicist that the sun on which we have been accustomed to place so much reliance cannot keep up its heat more than ten million years longer. "Gracious," she exclaimed, "we haven't much time left. I am getting alarmed. I was in hopes that we would have time to collect in some money and pay off our debts, anyway." Not being a learned physicist I do not know whether the sun has decided to go out of business or account of the high price of coal or not but I am sure that many of us have learned to not accept assertions as authority and we will continue to refuse to accept such damaging testimony until the evidence is all in, or until we think it is.

(6.) With regard to the Uinta Basin, in the absence of facts there are innumerable rumors, many of them of an adverse nature. Among these are assertions that oil-men and geologists have said there is no oil in the Basin, that there couldn't be, that there are no oil formations, that the structure is not right, that if there ever was oil here it has escaped or dried up, etc. These, I repeat, are rumors and they are unjust to geologists of repute as well as unfair to the country, for no true geologist would make statements of this kind until he had thoroughly investigated the matter, and this, I am quite sure, has never been done.

(7.) I am aware that scores of oil-geologists have made brief or longer visits to the Basin during the last year or two. I understand that some who have stayed but a short time and have seen but a small portion of the Basin have given adverse or discouraging reports. The only antidote for the poisonous effects of hasty snap-shot opinions are correlated and systematized facts.

(8.) Some have spent weeks or months in the country and have honestly tried to solve the problems which are sometimes puzzling and bewildering. Perhaps some of the facts which I have observed and which they have missed in the areas which they have studied, may help them toward the solution of these problems.

Seeking Fair Play for the Field.

(9.) Granting that there is oil here in paying quantities I can see that millions may be spent, the oil not be found in paying quantities, and the development of the field be set back for many years. The present time is a critical one and if I can have a little influence in turning the tide I

the direction of sane, impartial, broad-minded investigation of the conditions, and a level-headed, business-like way of developing the field—if these conditions warrant it—I will feel that my labor was not in vain.

(10.) One can hardly avoid the impression that the discovery and exploitation of oil at the present time is often too much of a gambling game, that there is too great an atmosphere of mystery surrounding the occurrence and recovery of petroleum—that there is too much of the Monte Carlo spirit connected with it. There is an element of risk in every kind of business operation. The oil man and mining man must be game to a certain extent and take chances; so must the merchant, the tradesman and the farmer, but I am decidedly of the opinion that mining operations need not be proportionally more hazardous than farming and no sane man would try to discourage this most useful occupation.

(11.) There is a personal factor, also. I not only wish the field to receive fair play but I wish to be understood myself. I have traveled many thousands of miles in and around the Basin and have had unusual opportunities for observation. At every trip the prospect widens; every excursion is a revelation, and I am more and more impressed with the fact that the only sane thing to do is to carry investigations to their limit, to carefully study and map the field, and, if conditions then look as favorable as they do now, to make tests with the drill. These things I have recommended to some oil companies. I feel that I have not been fully understood, and have sometimes been misquoted, but in these articles I wish to make my position clear, and by these I hope I may be judged rather than by alleged oral remarks, or by reports, which were mostly of a general nature, and were made while investigations were in progress.

In the next article I wish to indicate the principles to be followed, give an outline of the plan and offer some facts concerning surface indications in the Basin.

AFTER PAYING MILLIONS IN DIVIDENDS CALEDONIA PREPARES FOR FINAL EXIT

In the first nine months of this year the Caledonia Mining Company, near Wallace, in the Coeur d'Alenes, made a profit of \$53,844.96, chiefly from the leavings in worked-over stopes and drifts, according to a letter received recently by stockholders from Stanley A. Easton, president. The company now has on hand a surplus of \$401,358.03, which is to be distributed to stockholders as soon as it is known what part of it must be deducted for federal income and excess profits taxes. Although no new ore has been found for a long time and there is little hope of finding more, it will take nearly a year to clean up all the batches of good ore still remaining in stopes and dumps.

In the nine months the company mined 6,963.39 tons of dry ore, from which 994,095 pounds of lead, 148,051.02 ounces of silver and 4,757.33 pounds of copper were extracted. The gross value was \$84,423, the cost of mining was \$7.48 a ton, or \$52,105.26, and the shipping charge was 13.35 cents a ton, or \$929.35, leaving a profit of \$53,844.96.

"Production during the nine months is from the shipment of a small amount of ore, but comes mainly from reclaiming material in stope fillings and dumps left from the early operations of the property and on which a profit is now possible, because of improved working facilities, the good silver market, and the excellent smelter," says Mr. Easton. "It is estimated that it will require nearly a year to reclaim the material which still remains in old stopes and dumps.

"The standing ore of the mine is practically all gone

and development work done since my last report, which is continued, so far fails to disclose new ore and there is no substantial reason for expecting new disclosures. All of your company's ground will be thoroughly tested and prospected before development work is finally terminated.

"Former statements have explained the necessity of conserving the resources of the company until our liabilities on account of federal income and excess profits taxes for current and former years have been fully met. When this is done the remaining assets will be distributed among the stockholders. When it will be safe to do this and what amount will remain for such disbursement it is quite impossible to say. Every effort is being made to bring about an early discharge of the taxation liability and these efforts will be continued with diligence and best judgment."

The amount of surplus now in the Caledonia treasury would be more than enough to pay a dividend of 15 cents a share. How much this will amount to after all taxes are paid Mr. Easton says is not known. This company has paid \$4,141,950 in dividends, which has been \$1.59 a share.

UTAH SOUTHERN OIL IN NEW COMBINATION

The Utah Southern Oil Company has been added to a group of companies organized within the past year which have some earmarks of being offshoots of the Royal Dutch Shell interests. The company was incorporated in Utah last May with an authorized capital of 7,500,000 shares, par 10c., and a group of Salt Lake City people were named as incorporators, all owning one share each except George T. Hansen who was credited with being the owner of 2,999,994 shares. It acquired a prospecting permit in Garfield county and two in Emery county, Utah.

Little was heard of the new company until a month ago when it made a contract with the Ute Petroleum company for the joint testing of the Duchesne structure in northeastern Utah. New officers have succeeded the incorporators with the exception of Hansen. These include Frank Franz, vice-president; F. B. Weeks, former assistant director of U. S. Geological Survey, secretary and treasurer, and Max W. Ball, formerly with the Royal Dutch interests; L. F. Rains, of Salt Lake City, and C. F. Jennings, general purchasing agent of the Utah Copper company, directors.

The company has leases on the Circle Cliffs, San Rafael Swell and Woodside structures in Utah and Dove Creek and Dolores structures in southwestern Colorado. The acreage on the Duchesne structure was originally acquired in the interests of the Matador Petroleum Co., subsidiary of the Royal Dutch of which Max Ball was head. Ball resigned, became president of the Ute Petroleum which took over some of the Matador holdings, and part of which have now passed to the Utah Southern.

Salt Lake advices say the Utah Southern is considering the purchase of a producing property in Salt Creek and another in Cat Creek and is examining conditions with a view to erecting a refinery at Salt Lake City. It is understood that practically all the company's acreage was originally investigated by geologists in the employ of the Royal Dutch. Other companies holding a large acreage or other interests organized within the past year and about which little is known and most of which contains directors or officers identified with the other companies are: Western Pipe Line Co., which has projected a pipe line between Salt Creek and Casper; Utah Petroleum Co., with acreage in Utah; Matador Petroleum, subsidiary of Royal Dutch, and Plateau Oil Corporation, with extensive acreage in western Kansas.—*Wyoming Oil News.*

COMMERCIAL PRODUCTION OF SHALE OIL

By James A. Bishop*.

We use the term PRODUCTION of shale oil advisedly for the reason that little, if any oil as such, exists in shale. But the necessary elements for the composition of gases and oil do exist, and the question is often asked, can marketable oils be produced on a commercial basis? Commercial basis, at the present instance, means a competitive price with that of petroleum oils. Those who are in a position to know tell us that one well in five is an actual producer. If we include as the actual cost of active wells, all the funds wasted in wild-catting, dry wells and the like, the returns dollar for dollar are decidedly in favor of the shale oil. But one of the inherited qualities in man is the desire to take the gambler's chance on big returns, rather than place his surplus funds in conservative investments insuring smaller but certain dividends.

Although an accountant would charge all expenditures, including the cost of the dry wells, against the profits of the gusher, we will give to petroleum the great advantage of charging the cost of dry wells to loss and gain. It is not the purpose of this article to enter into financial technicalities. Rather let us assume that sufficient competition still exists within the ranks of petroleum producers to gauge the price of crude by the cost of production, the abundance of the supply and demand. Naturally the lowest possible price at which refined petroleum can be produced places the greater strain upon the shale oil industry to meet the competitive standard. At present writing the tendency of the market price of petroleum is decidedly upward. The lowest price for crude in recent years is fifty cents per barrel. Those in the refining industry tell us that \$1.50 is a fair price for the refining of a barrel of oil. With the cost of crude at 50 cents per barrel and that of refining at \$1.50, the cost of refined petroleum cannot be less than \$2.00 per barrel. A very common practice among the manufacturers is to consider the cost of marketing plus a reasonable profit equal 100 per cent of the cost of production. If then the cost of producing one barrel of petroleum cannot be less than \$2.00, the minimum wholesale price should not be less than \$4.00 per barrel.

Can Shale Oils Meet Such Standards?

Evidently shale oil cannot compete for supremacy in the oil market until it can be produced and refined at the same price as petroleum, which at lowest figures is \$2.00 per barrel. The usual line of argument for the production of shale oil allows \$1.25 for mining and crushing the shale, 35 cents for retorting and \$1.50 per barrel for refining, making a total of \$3.10 plus the freight charges in transporting the crude oil to the refinery. These figures seem to prove conclusively that the cost of producing oil shale is prohibitive, and that the day of shale oil is not yet.

Now, the production of shale oil has a serious handicap placed upon it at the beginning of the process. It requires the expert service of both mining and chemical engineers. Unfortunately efforts have been made to find efficiency in both branches in one and the same person. But the exigencies of the case require a high degree of technique in each department such as can be found only in experience and specialization. If conditions and practices now in vogue are prohibitive, managers of plants must be versatile enough to change to practical methods. It is evident that severest economy must feature each phase of the process, an econ-

omy secured through the reduction of labor by the use of automatic devices.

The Refinery the Crucial Test.

As we have allowed \$1.25 for mining and crushing the shale, (which cost we believe could be lowered) we must perform the double process of retorting and refining at a cost of 75 cents per barrel, assuming that one ton of shale will produce one barrel of oil. Allowing ourselves the small margin of 75 cents per ton, or per barrel at once eliminates the shipment of shale for treatment to places having greater transportation facilities. It even prohibits the shipment of crude oil to distant refineries after being retorted at the mine, both of which plans are favorite arguments advanced to the too confiding stock purchaser. There remains but one avenue open for success. Shale oil must be refined at the mine. Yea more, the retorting of the oil from shale and the refining of same must be accomplished as one operation. Revolutionary as this statement may seem, it is no pipe dream, but a plan made to conform with the subtle laws of physical chemistry. Neither can it be called a mere laboratory test, as a crude low grade petroleum oil ran at a petroleum refinery 14 per cent gasoline, while the same oil gave, by passing through the refining end of the combined process, which I have invented, 22 per cent gasoline.

We make no claim to the creation of gasoline by passing the crude oil through an improved refining process. The 22 per cent of gasoline secured by the latter process was evidently blended in the crude with other oils when the test in the petroleum refinery was made. But the method employed failed to secure the full content of gasoline.

The consensus of opinion among leaders in the refining industry, is that much time and energy is wasted in producing a great number of fractions. That the commercial demand can be supplied to a large degree with five grades or fractions. Our plea for economy in the reduction plant presupposes limiting fractions to the smallest number required by the public.

The present method of refining mineral oils is not a cheap process as viewed from the fuel consumption. It is estimated that the coal consumed, is about one-tenth the weight of the oil vaporized, and that the vaporizing of the heavy residues often run as high as 50 per cent by weight. A further loss occurs in refining, when by the cracking process the light hydrocarbon gases are formed, often entailing a loss of 6 to 8 per cent of the oils. Now, since shale oil is slightly more asphaltic in character and of greater specific gravity it follows that a greater percentage of fuel must be used in converting it into the vapor state. Also the desire to imitate petroleum in character, quality, specific gravity and the like, requires that the cracking process be carried to a greater extent with shale oils, with the consequent production of a greater amount of fixed gases.

These facts argue conclusively that some improvements in the methods of refining should be made to more perfectly adapt them to the treatment of shale oils.

All Conditions Favor the One Process.

Whether we advocate the refining of shale oil at some refinery remote from the shale fields or on the plant site, all conditions favor the one process method of retorting and refining. The formation of oils from kerogen requires slightly higher temperature than the boiling points of the separate oils after their productions. The volume of gas needed will depend largely on the conservation of fuel in retorting. Approximately 2,000 cubic feet of gas should retort one ton of

*Industrial engineer 1265 Lafayette St., Denver, Colorado, in November Issue Shale Review.

shale. Since the vapors leave the retort somewhat above the boiling point of their corresponding liquids, the amount of fuel required for the combined process should not exceed 3,000 cubic feet per barrel of oil produced. There will be few freight and drayage charges other than those in shipments of refined oil. There will be no spent shale dumps 300 to 400 miles from the shale fields as silent reminders of vanishing dividends transformed into freight bills. The smallest possible amount of fixed gas in both retorting and refining will be produced, and that will be in position to contribute to the economics of the fuel supply.

Both research and commercial ends of the shale oil industry have made material gains during the last year. In the science and art of oil production there is much work to be done, much yet to be learned. But the industry can soon be reckoned, not a competitor, but a strong supplementary factor in the production of mineral oils. Even at the present writing, with proper methods, the oil can be manufactured and refined at the standard price established by the supply and demand of petroleum.

MINING REVIVAL IN SOUTHERN NEVADA.

By Al H. Martin.

With Tonopah producing in excess of \$250,000 per month, the new camps of Royston and Hornsilver exciting wide interest, and the old districts of Goldfield and Pioneer promising to stage a real "come-back," the mining outlook in southern Nevada is more promising than at any time since the world war. Both Royston and Hornsilver appear on the verge of real booms, although developments have not advanced to a sufficient extent, save in the Orleans mine at Hornsilver, on which to base a conservative forecast of the future. Several rich discoveries have been reported in the past two weeks from both camps, and lessees on the Hudson ground, at Royston, are shipping to the Mac-Namara mill at Tonopah. The Orleans Co. reports the big vein has been encountered in a crosscut from the 700 level, and this Hornsilver mine appears one of the most promising silver-gold propositions in Nevada.

At Goldfield chief interest centers on the vertical shaft being sunk by the Goldfield Deep Mines Co., as it is realized that on the results attending this project depends the future of the entire Goldfield district. The shaft has passed the 1100-foot point and is being sent to a depth of 2400 feet with the aid of two powerful hoisting plants, one stationed at surface, the other on the 800 level. The management expects to reach the 1600-foot level early in March, when a station will be cut, pumps installed and the shaft rushed its final 800 feet to reach the Florence-Goldfield Consolidated ore-channel in the alaskite, below the barren shale intrusion. In the alaskite the vein-system is expected to show the same high gold values that marked its presence in the dacite, latite and other formations above the shale.

The Crackerjack Co. has acquired the Park group of nine claims in the Railroad Springs district, adjoining the Gold Hill mine of the Goldfield Development Co. Prospecting on the surface has begun and a site selected for a shaft. The company is also preparing for an aggressive campaign of development in its lease on the Florence mine, with operations to be carried forward from the 800 level of the Red Hill shaft. In neighboring territory the Red Hill

The Paddy Pride Co., operating at Shoshone, has completed an aerial tramway from the mine tunnel to the shipping bins, and is sending high-grade ore to the rail-

road station at Zabriskie by mule-teams, which have proven more dependable than motor trucks. The company is shipping ore sampling over \$100 per ton in gold, silver and lead to Utah smelters. The milling product is to be treated at the concentrator of the Tecopa Consolidated, 15 miles distant. The ore body is eight to nine feet wide with the shipping material two to three feet wide.

A huge vein of milling ore, accompanied by shoots of shipping quartz, has been opened in the Starlight mine of the Consolidated Mayflower Co., at Pioneer. The discovery is considered the most important made in the district for many years and the vein is widening and showing richer ore as depth is gained. The better-grade material averages around \$30 per ton, with an immense amount of \$12 to \$15 gold ore stated to be in sight. Fully one-half of the ore going to the Mayflower mill is coming from the Starlight workings. Some excellent ore has been exposed recently in the Mayflower mine, including shoots of specimen quartz. General Manager W. J. Tobin has ten stamps in operation and expects to put five more in commission shortly.

The Fish Lake Valley field, about thirty miles west of Goldfield, is claiming much attention as a potential oil producer. The Tonopah & Goldfield Railroad Co. has financed the Fish Lake Merger Co. to drill to 4000 feet unless a commercial well is earlier developed. The well is down 985 feet in a hard formation after passing through shale showing oil and gas. The Fish Lake Imperial Co., controlled by the Tonopah Mining and Tonopah & Goldfield Railroad companies, has acquired four sections four miles north of the Merger well and is preparing to install a powerful rig. Several other companies are arranging to erect standard rigs and start drilling.

DRY SILVER ORE YIELDS PROFIT BY FLOTATION PROCESS TREATMENT

L. H. Biggar, manager of the Ottawa Mining and Smelting Company, five miles out of Slocan City on Springer Creek, B. C., returned recently from the Trail smelter, where a parcel of Ottawa concentrates had just been treated. Particular interest centered on the shipment because it was the first product of a new adaptation of the flotation process to dry silver ores and its success marks a step forward in the treatment of all similar low-grade ores in the district.

It converts what is practically a waste product into a valuable asset. Mr. Biggar reports that 700 tons of mill feed ore averaging 12 ounces to the ton was reduced to 20 tons of concentrates containing 75 per cent of the total silver contents, roughly 6000 ounces, and that the total costs of milling and handling were only \$2 to the ton of ore from the dump to the smelter.

As the smelter is 80 miles distant and the values are concentrated down to one thirty-fifth of the original bulk, the saving in freight alone is apparent and the Ottawa mill process bids fair to open a new era in dry silver ore treatment.

Mr. Biggar and associates have a four-year lease on the mine and enough ore broken to keep their plant occupied for that period, but it is their intention, having demonstrated its practicability, to extend the plant and to treat ores for the neighboring owners. The Ottawa is looking well and a comprehensive development program has been mapped out for the winter, while the mill will be running on full time.

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*Illustrated.

BUY SOMETHING MADE OF COPPER.

If any important object relating to business and commercial success in this day and age, is to be attained it is imperative that it be given wholesome, wholehearted publicity. In keeping with that idea a new slogan has recently been proclaimed in the West. It is: "Buy something made of copper." While the idea has had its birth in the mining West, there is nothing restrictive or regional in its application. Carried into effect the good it will accomplish must of necessity be far-reaching and stimulating to business and individual prosperity. There are thousands of ways in which copper can be utilized to a greater extent than is now being done and thousands of new uses for the metal can be found.

Structural architects can aid the cause immeasurably by specifying more copper and brass in their building hardware—a more general application of copper roofing materials, cornices, copings, etc., with more copper and brass finishing materials in their plans.

Contractors and constructing engineers can accomplish just as much by suggesting the use of copper materials, or materials into which copper enters, for other materials called for in specifications.

Manufacturers of small hardware, ornamental and other-

wise, can utilize the metal in creating new designs for everyday useful articles, and thus help to create a demand by introducing new styles and new ideas to their trade.

Home builders can do their "bit" by advising their architects that they prefer copper and brass to iron and porcelain trimmings, either plated or not; while the household matron can materially assist the cause by insisting on having copper kettles, buckets and pans made of copper and brass, and tin-lined where required. By so doing they can bring about a demand that will consume much copper and at the same time receive goods that will out-wear anything they now are in the habit of buying. All they need to do is to demand the goods. The manufacturer and the dealer will see to it that they receive them.

We are boosters for this new and important slogan: "Buy something made of copper" for these and hundreds of other reasons that would require unlimited space to even touch upon.

We want to see the mammoth copper mines and smelters of this country which are nearly all closed down to resume operations and keep running for the next hundred years. There is an accumulation of 600,000,000 or 700,000,000 pounds of copper in this country which we want to see utilized quickly. We shall be ready, according to copper authorities, to "go" again when half of this staggering amount of metal is consumed; that it will take about 300,000,000 pounds to keep the channels of distribution supplied. So that, if the buyers for the 120,000,000 people of this country would wake up and buy something made of copper during the next sixty days even though the purchases did not average more than FIVE POUNDS to the customer, the menacing surplus of the red metal would be completely wiped out. This statement is backed by the fact that shipments of copper abroad have been ranging from 40,000,000 to 60,000,000 pounds a month, and that the amount is climbing rapidly.

Buy Something Made of Copper.

SOME NOTABLE DIVIDENDS

In advancing the battle-cry of "buy something made of copper" and to illustrate a specific point as to what it means to foster the copper mining industry, let us call your attention to the past dividend records of the so-called Jackling "porphyries." None of these properties are very old, and all, or nearly all of them, are certainly capable of repeating past performance under normal operating conditions and a stable market for the red metal. Readers of the *Mining Review* are intimately familiar with the records which this particular class of mines has made in the matter of production, and many of them are familiar with their dividend-paying performances, because they have participated in them. But the world in general knows little about it and, because of not being directly concerned, has probably cared less.

We make mention here of only five mines. They have been selected because of the local interest that has always attached to them and because people of this region will be better able to grasp the importance of the copper mining industry as a whole by consulting a smaller number of figures than would be the case if the subject was enlarged upon. These five mines—the Utah Copper, Nevada Consolidated, Butte & Superior, Ray Consolidated and Chino—all of which owe their prominence and worth to the untiring efforts and guidance of D. C. Jackling and his close associates—have during the past twelve years and less, paid to their stockholders, numbering several thousands of people, the vast sum of \$227,700,844. They have paid from \$16.32 to \$72.75 for each single share of stock issued. Here is the record as dis-

closed in the tabulation of one of the big Eastern financial publications:

Utah Copper Company.....	\$72.75	\$114,758,645
Nevada Consolidated	23.40	40,869,627
Butte and Superior.....	60.90	10,940,258
Ray Consolidated	16.32	25,140,331
Chino	34.52	29,991,783

Grant total \$227,700,844

Do you want to see companies like these operating at capacity again and employing several thousand men, as formerly? If you do, "buy something made of copper."

BUREAU OF MINES MAKING PETROLEUM INVESTIGATIONS.

A field investigation of pumping equipment used in the Mid-Continent field is being made by the Bureau of Mines.

Work is in progress at the Pittsburgh, Pa., experiment station on the relation of sulphur, unsaturates, and gum-forming compounds to suitability for motor fuel.

A survey of the Mexia oil field in Texas will be begun shortly by the Dallas office of the Bureau of Mines. It is expected to define the strata in the proven area and to outline the best methods of production and conservation for this particular field.

Tests at the Bartlesville station on low-pressure gas burners used in oil-field boilers have been completed. Eleven low-pressure burners were tested in this investigation. Arrangements have been made to obtain additional field data on steam consumption under different drilling operations.

At the petroleum experiment station at Bartlesville, Okla., of the Bureau of Mines the field investigation on losses of crude oil by evaporation from lease storage tanks has been completed. In one producing district a thorough study of evaporation losses was made, first, under ordinary storage conditions, and later, with the lease storage tanks equipped with gas-tight roofs. The saving due to the installation of new, up-to-date equipment amounted to from two to four barrels of oil per day for each tank covered. An investigation has been started to determine the loss of crude oil through evaporation at pipeline measuring stations, and arrangements have been made for a series of tests on a trunk pipeline from the Cushing and Glenn Pool fields to a station at Powderly, Texas.

At the Boulder, Colo., field office of the Bureau of Mines the cooperative oil-shale laboratory has been enlarged and much new equipment has been added preparatory to more extensive work on Colorado shales. Additions to the staff at the laboratory include Douglas A. Fell, a native of New South Wales, whose father is the owner of the only producing oil-shale company in Australia. Important changes have been made in the temperature measuring apparatus and in the drive mechanism of the horizontal retort at this station. A new location of pyrometers in the retort proper and the retort furnace is expected to indicate more accurately the temperature of the shale in the retort and also make possible more definite control of retorting conditions. During the past two years several attempts have been made to classify oil shales by chemical determinations of various sorts, but these have not been successful. It has been suggested that the quality of oil to be obtained from a given oil shale will be most influenced by the C. H. O. ratio in the organic matter of the shale. Work is now under way seeking to determine this ratio for several representative shales. The plan of work involves (1) the separation

of the organic from the inorganic constituents of the shales; (2) the elementary combustion analysis of the recovered organic matter; (3) the retorting of a sample of the same shale in the assay retorts; and (4) a distillation analysis and chemical examination of the oils produced by the assay retorts. This work is now well under way although at the start considerable difficulty was experienced in making a clean separation between the organic and inorganic parts of the shale. A method for the separation has been developed, however, that appears to be quite satisfactory. Experiments in refining the oils produced from Colorado oil shales have been started. Various methods of procedure will be tried and the concentration of the refining reagents changed until the most satisfactory results have been obtained. For the purpose of comparing different oil shales it has been tentatively agreed that the most satisfactory oil is that which yields the highest percentage of crude naptha containing the lowest percentage of unsaturated hydrocarbons.

DAVIS-DALY AND EAST BUTTE MERGER

The recent closing down of the Davis-Daly and East Butte properties at Butte is at least partially explained in the following gossipy merger story, sent out from Boston on the 18th:

Negotiations are in progress with a view to merging the Davis-Daly and East Butte copper companies. Operating executives were in Boston this week and with the officials of the companies held informal conferences. Developments to date, however, are purely embryonic, having more to do with respective property values than with an exchange of securities.

Provided a satisfactory agreement can be reached on questions of finance, it is seemingly the logical thing for these two companies to consolidate. Davis-Daly has a well developed and valuable mine, traversed by a rich vein, and it has in the last twenty-four months put a large amount of commercial ore in sight. It has recently enlarged and re-equipped its plant and brought hoists and mining facilities to a point where it can take advantage of the increased tonnage of developed ore.

East Butte has an up-to-date smelter and reduction works and over \$1,500,000 in cash and copper, a very large amount of which is cash. Through the efforts of President Gross it has grown from a doubtful enterprise ten years ago to a prosperous property. But its Pittsmtont mine has been operating for a relatively long time and is getting to a point where the addition of a relatively new and highly developed property like the Davis-Daly's Colorado mine would round out a copper mining entity that would conceivably be very profitable to stockholders of both companies.

Davis-Daly has outstanding 600,000 shares of stock and capacity for a production of 15,000,000 pounds of copper annually; East Butte has 420,000 shares of outstanding stock with capacity for 25,000,000 pounds of metal a year. Not all this latter, however, means actual production of East Butte's mine for the company has been treating Davis-Daly's ore on a custom toll basis for several years and includes this in its own smelter production.

WANTED—Superintendent, by Contracting Company doing a large amount of shaft sinking in the bituminous coal fields east of Ohio river. Requirements: Man of sufficient ability to take entire charge of erecting sinking plant, rock work, and lining shaft with concrete. State age, experience and salary wanted. Address The Dravo Contracting Company, Pittsburgh, Pa.

ROCHESTER COMBINED SILVER MILL TO BE MOVED TO CANDELARIA

Confirmation of the deal by which the Rochester Silver Corporation is to finance the construction of a mill for the Candelaria Mines Company at the old camp of Candelaria in Mineral county, was given yesterday by O. W. Jones, president of the Rochester Silver Corporation, who arrived in Winnemucca Saturday from Reno, where the contract was entered into last week, says the Humboldt Star of the 21st.

By the terms of the deal, the Candelaria Mines Company takes over the Rochester Combined mill at Rochester, which was built by L. A. Friedman about three years ago, and never run. The mill, which is equipped with the latest machinery and of about 300 tons daily capacity, is to be moved to the Candelaria property and used in the reduction of the large quantity of ore already developed, which is said by engineers' reports to amount to 610,000 tons of the average value of \$15 per ton.

The Rochester Silver Corporation, Mr. Jones says, is to also advance money to the Candelaria company to carry on operations to place it on a producing basis. A mortgage is to be given to secure the Rochester Silver Corporation.

Mr. Jones will remain in Winnemucca of few days before returning to his home in Chicago. He is the principal owner of the Nevada Sunshine property in the Sunshine district near here, upon which extensive development operations are now going on with most favorable results. Ore is now being extracted and shipments will be made as soon as ore and smelting rates are more favorable.

NEW MAP OF WYOMING OIL FIELDS

An oil-field map of Wyoming just issued is the fifth of a series of maps showing the oil fields in certain states that is being prepared by the United States Geological Survey, Department of the Interior. Besides showing, by colors, the locations of the oil and gas pools, including every district that has yielded either oil or gas in commercial quantity, it indicates by appropriate colors and symbols the locations of pipe lines and refineries and the positions and names of 192 anticlines. These anticlines include all that have been mapped by the geologists of the United States Geological Survey and a large portion of those that have been discovered through the activities of the principal oil companies operating in Wyoming. These oil companies, without exception, contributed information to help make the map accurate and complete, and it can therefore be confidently stated that it is far superior to any previous map showing the oil fields of the state.

In spite of the large number of anticlines shown they do not include all that exist in the state. The spacing and trend of the folds as they appear on the map show that there must be many not yet discovered.

For example, the long stretch along the east front of the Laramie mountains, between the anticlines near Douglas on the north of those of Cheyenne and Laramie on the south, must contain a number of anticline folds, and if oil is discovered in quantity in either of the groups of anticlines mentioned, intensive prospecting will doubtless discover many more in the intervening region.

Similarly, so far as the map shows, the east front of the Big Horn Mountains is strikingly free from anticlinal folds, but this absence of folds must be more apparent than real. The geologic conditions in this area are such that it is not only difficult to determine the position and extent of anticlines but

also to learn the depth to which drilling would have to be carried on them in order to reach the oil-bearing formations. Many believe that this depth is so great as to render the chances of success very doubtful, and therefore there is but slight incentive for undertaking the expensive work needed to discover and map these folds.

Southern Sweetwater country is another area where anticlines not shown on the map must exist. This is sufficiently indicated by the extent of the Rock Springs anticline, in the central part of the country. Here also, however, prospecting is difficult and the value of the folds even if discovered is problematic.

One of the most significant facts shown on the map is the coincidence between the oil and gas fields and the anticline folds. Such fields as are not on pronounced anticlines have as a rule yielded only a small output. The foolishness and uselessness of random drilling without respect to the location of anticlinal folding could not well be better demonstrated.

The Osage field, in Weston county, is an apparent exception, but as a matter of fact this field and other small producers along the western margin of the Black hills show a very distinct relation to structure, although it is not anticlinal structure, and geologists can be of quite as great assistance in selecting areas for prospecting in this region as in the regions of more intensely folded beds farther west.

Extravagantly worded literature issued by promoters frequently uses the location of properties on or near some well-known anticline as an argument for certain success. The map shows that the majority of the anticlines of the state are not productive of oil, although the oil that is found is almost always associated with anticline structure. The number of producing oil fields is but 17 per cent of the number of anticlines shown on the map.

The fact that only a tiny portion of Wyoming is actually yielding oil is strikingly brought out by this map. There are large areas where not only no oil has been discovered but where even the details of geologic structure which may indicate the existence or absence of oil are unknown, and there remains ample room in the state for both prospector and geologist to develop new and almost unsuspected fields.

The map, which is on the scale of approximately 8 miles to the inch, making its dimensions $3\frac{1}{2}$ by $4\frac{1}{2}$ feet, may be obtained from the Director of the United States Geological Survey, Washington, D. C., for 50 cents a copy.

COPPER SALES MAY EXCEED 1,000,000,000 POUNDS

It is estimated that total sales of copper in the first ten months of this year were in excess of 850,000,000 pounds, says the New York Curb.

If the monthly sales in November and December are in a party with the October sales of 140,000,000 pounds, it will mean total 1921 sales of approximately 1,300,000,000 pounds. Total sales for last year were in excess of 1,400,000,000 pounds. Even if business falls off for the rest of the year the 1921 sales should run in excess of 1,000,000,000 pounds.

At a superficial glance, the last named figure would indicate a falling off of more than 400,000,000 pounds compared with 1920. However domestic sales were comparatively heavy last year since the business depression did not affect the big copper manufacturing concerns until the latter part of 1920. Exports since the beginning of this year have shown a healthy expansion.

Sales for export in the first ten months of 1921 were about 500,000,000 pounds, against 480,000,000 pounds in the whole of 1920. At this rate, the export sales should total more than 600,000,000 for this year.

In Nearby States

ARIZONA

Tom Frazier, mining man of Patagonia, his recently secured a lease on the Luck Shure property at Tombstone and will soon begin extensive operations on this property.

A deed conveying all mines, mine equipment, property and assets of the Jerome Vesda Copper company to the Jerome Verde Development for a consideration named at \$420,000, has been filed for record with the recorder of this city.

A strike of considerable importance has been made on the Silver King mine, 15 miles east of Kingman, by Walter Meyers, it is reported. A tunnel has been started to tap the old water channel in the mine for irrigation purposes and when in about 40 feet from the old works cut a stringer of ore that ran better than \$700 in silver.

At the Tom Reed mine they are now putting through the mill 275 tons of ore daily. About the 15th of the present month when the ore already broken is used up the tonnage will be cut down to 100 tons daily. There are now 71 men on the pay roll. It is expected that close to this force can be maintained running on the 100 ton basis.

According to the Oatman Mining News, A. C. Werden has a crew at work on the Old Moss Mine. They are driving a crosscut at shallow depth hoping to intersect an ore body that they believe will prove of sufficient importance to warrant going ahead with development on a large scale. The Moss is perhaps the most famous gold property in the whole River Range district, but for the romantic stories which are linked with the first discovery of gold in Mohave county. It was here that Captain James Moss, the noted Indian scout, took out over \$200,000 in high-grade rock some sixty years ago.

E. J. Welch brought a sample of ore from his mines in the high Wallapais to Kingman, which gave an assay return of 2800 ounces silver. The ore is a talcy material running through a quartz vein, the whole mass carrying values Mr. Welch recently located this vein, which lies to the north and west of the old American Flag and to the east of the Dean. Mr. Welch has done some work on the new claim, and now that he has found it to be enormously rich it is his intention to proceed with greater expedition in the work of development.—Kingman Miner.

BRITISH COLUMBIA

Reports at hand are that the Utica mine, in the Ainsworth district has struck two new streaks in their lowest level, No. 4 tunnel. One of them is 24 inches and the other 18 inches wide. Both are in clean ore of good milling quality.

According to reports received at Spokane, Wash., an important gold strike has been made in the Bayonne group of mines, owned by John B. White of Spokane and associates. The property is located between Salmon valley and Kootenay lake, west of Sheep creek.

A contract has been given to the Kootenay Engineering and Construction Company of Nelson, for the erection of an aerial bucket tramway at the McAllister mine, Sandon. The McAllister is a silver-lead property and carries high silver values, also some gold, in a gray copper formation.

W. B. Pool, of Spokane, Washington, president of the Reno mines, at Sheep Creek, who recently concluded a tour of the properties, says that six additional miners have been

taken on to open up No. 1 and No. 2 veins, both of which show good gold values. The program of winter work is designed to prove the extent and richness of the ore bodies preparatory to embarking on a more ambitious scheme.

A big body of high-grade copper ore has been discovered in the Monarch mine owned by the Spokane Mining and Development Company, according to C. M. Mohn, managing director. The property is on Falls Creek, seven miles west of Nelson. A crosscut a short time ago struck a large body of ore which has been penetrated six feet beyond the footwall. The crosscut will be continued until the hanging wall is reached and then drifting will be commenced. It is estimated that the ore can be mined, shipped and smelted at \$8 a ton. Its assay content is said to be \$21 a ton, chiefly in copper.

COLORADO

The Capital mine at Georgetown is now installing an electric equipment, which will be in readiness for operation soon.

The plant of the Western Zinc Oxide Company, located at Leadville, has recently resumed operations on a 50 per cent scale, using 18 of the 34 furnaces. In addition to Leadville ores, high grade ore is shipped from outside points.

The Smuggler-Union Mining Company has acquired the right to the waters of Ophir lake as an additional power reservoir and have piped it to the Bullion tunnel and elsewhere about the mines where wanted.

The Wasatch Company, which recently dismantled the old Scotia mill at Silver Plume and removed it up to the Mendota mine, has about completed rebuilding and remodeling of the mill and will soon have it in operation at the portal of the tunnel. The change was made to cut out the expense of having to haul the ore from the mine to the mill.

Several weeks ago Manager Baur, of the Hidden Treasure Company, shipped his first two cars of concentrates to the smelter. Commencing this week, the Hidden Treasure expects to ship an average of three cars per week, continuing through the winter. A trail, much lower than the present one, from the mine to Camp Bird, is being constructed, and the company expects to keep it open during the winter months.—Ouray Herald.

The Caribou Hill Mining Company, according to a Boulder dispatch, is hoisting high grade ore from a new shoot recently opened up that has been pronounced by mining men, one of the biggest and richest ore bodies opened to date on the famous hill. The development persistently carried on since the company commenced operations has resulted in exposure of five distinct ore veins, and daily shipments will soon be started and maintained for an indefinite period.

The little Mattie mine, on Chicago creek, which has been closed for a long time, has been taken over by a new company and contracts signed for the installation of a high pressure wood pipe line from the reservoir to the mill, says Walter A. Funk. A force of men is now engaged in removing the old steel line and preparing the grade for the new wood pipe line, which is being shipped from Seattle. It is the intention of the new company to pump out the mine, rehabilitate the old mill and be in full swing in January. Both mine and mill will eventually be electrified.—Georgetown Courier.

IDAHO

It is reported that the Rex mine in the Coeur d'Alenes will continue to work all winter in the old workings. This work

is proving satisfactory. Work in the Benefactor group, belonging to the Rex, will not be resumed until spring.

The shaft of the Amazon-Dixie in the east Coeur d'Alenes, has been sunk to the Revett formation and it is expected that ore will soon be struck in greater quantity. It will require three months to reach the 1500 foot level, where a drift is to be run to the ore body.

According to reports received at Spokane, Washington, there are many indications that the Day Brothers intend to resume the first of the year the operation of their extensive mining enterprises in the Coeur d'Alenes. These include both the Hercules and the Tamerack and Custer, two of the greatest lead-silver mines in the United States.

The new crosscut on the Jim Blaine group, on Pine creek, has been driven 220 feet, according to reports, and has penetrated a blind vein for 21 feet without reaching the wall. The mineral is reported to contain 3 per cent lead, and two ounces of silver to the ton. Additional men have been employed recently.

Seven carloads of ore have been shipped by leasers of the Sister mine on Canyon creek, a short distance above Wallace. The last car contained 31 tons and is believed to have been the richest ore shipped. These leasers expect to be able to continue shipments of a carload every two or three weeks. The ore is from a point 930 feet from the portal of the main tunnel.

Progress is reliably informed that negotiations for the transfer of the Kimmel group of claims to the Dewey Bros. of Nampa, have been completed and that the new owners will begin development operations at an early date. It is understood that Bert Haug has been associated with the Deweys for a number of years, and has a reputation for strict integrity and square dealing.

Julius P. Hall, mining engineer of Leadore, left during the month for Santa, in Benewah county, for the purpose of examining placer ground. Placer mining has been carried on more or less successfully in that vicinity for many years, and it is stated that there is much ground that could probably be profitably worked on a large scale with the necessary capital available.

Money raised by assessment March 14, which was expected to be sufficient to continue development of the Chicago-Boston Mining Company for six months, has proved enough to carry the company's work through eight months, according to a report received recently from Donald A. Callahan, president of the Galena Mining Company, which has been incorporated and taken over the holdings in the Coeur d'Alenes of the Chicago-Boston and the Killbuck companies.

Francis A. Thompson, dean of the Idaho school of mines and executive secretary of the state bureau of mines and geology, was in Wallace recently. Among other matters to which he gave his attention while here was the big iron ledge or ledges on the west fork of Pine creek. This ore is said to be hematite of a character that gives it great commercial value for the manufacture of iron and steel, and a company has been organized and has taken options on the property with the view to utilize it.

A nine-foot body of lead-bearing ore was discovered recently in the east drift of the Lookout mine of the Coeur d'Alenes. The discovery may make the Lookout one of the coming mines of the district, according to reports. The ore is similar to that found in the upper workings of the Caledonia and Sierra Nevada mines, as it carries much crystallized lead and occurs in lead carbonate form, mixed with galena.

It is 300 feet deeper than the upper tunnel and is said to gain additional depth as the drift progresses.

Resumption of operations in the Nabob Con. Mining Company's property on Pine Creek in the Coeur d'Alenes, is predicted by Charles H. Fisher, recently elected as one of the new directors of the company. Judge A. H. Featherstone of Wallace, has rendered a decision directing the transfer of a large block of stock held in the east to Spokane men who hold a mortgage on it. This transfer gives Spokane and Coeur d'Alene men control of the property and they have elected a new board of whom E. J. Lippert, Charles H. Fisher, J. E. Codd, and A. W. Codd, are all of Spokane. A. E. McCarty, the fifth director, is a resident of Coeur d'Alene.

T. F. Bradshaw, manager of the United Mines Company, near Muldoon, has been in Hailey, looking after business for the company and laying in winter supplies. The company is operating a group of eight claims in Garfield Gulch, three of the claims having been purchased from Neil Campbell, one of the best known mining men of this section. A payment of \$5000 was made to Mr. Campbell last week on the property they had secured from him. The total purchase price is \$30,000. The property is a lead-silver proposition and where the vein has been opened up, shows a good grade of milling ore, in quantity sufficient to furnish ample ore bodies for profitable work.

NEVADA.

Wm. H. Webb reports that he is taking out rich ore from his lease south of the Bristol district. He expects shortly to ship a car of ore.

Several properties in the old Osceola district now have shipping ore in sight. The Sunrise, producing gold ore, is the latest to report bullion shipments.

The Leadville Mines Company, operating in northern Washoe County, under the management of A. A. Codd, formerly of Goldfield, shipped three carloads of concentrates during October. They were valued at \$200 a ton.

Ten stamps are in operation at the old Mayflower mine at Rhyolite. A large body of commercial ore has been developed in the Mayflower and Starlight properties, which it is believed will keep the present mill busy for a number of years.

Early in the month a deal was closed for a lease and option on the Pittsburg-Liberty mine in Masonic by the owners, P. J. Conway, J. F. Fredericks, Judge P. R. Parker and J. M. Bryan, and H. C. Barnes, according to the Bridgeport Chronicle Union.

T. C. Hough has been granted a lease by the Amalgamated Pioche Mines & Smelter Corporation on the Deer Foot claim. Careful sampling has demonstrated the presence of a two foot vein of silicious-silver ore on the surface which averages over twenty ounces to the ton. This showing will be developed.

Ore of exceedingly high grade has been found at several points recently in reopening the Fitzgerald section of the Cons. Cortez mine, near Battle Mountain. At one point the miners started to break ore from a vein measuring over two feet in width and assaying 234 oz. silver. One sample of the high grade from this vein gave an assay of 3980 oz. silver and \$41.80 gold per ton.

F. H. Lerchen, who has a bond and lease on the Lodi Mines, 45 miles northeast of Luning, has also bonded the old Downieville lead-silver mine, 10 miles southwest of the

odi Mining Co. Lerchen has purchased a 25-h.p. gasoline hoist from James Calvert which has been installed at the old shaft, through which exploratory work will be done.

Jules V. Barnd, president and general manager of the Consolidated Spanish Belt Silver Mining Company, left this morning for Toledo, Ohio. After a visit of a short time there he will take his family to Los Angeles to establish a new home, and will then return to Tonopah to look after development at the Spanish Belt property.—Tonopah Mining Reporter, 19th.

Two carloads of silver-lead concentrates have been shipped this month from Gerlach by the Leadville Mines Co. to a Utah smelter. Two more carloads will be turned out at the mill and the plant will then be shut down for the winter about December 15. While the mill is idle the motive power will be increased by the installation of a 75-h.p. semi-Deisel engine and other changes made that will bring the capacity up to 50 tons per day.

James Trainer, who with Henry Mathias and J. J. McIsaacs, are leasing on the Utah mine at Lander, was in Battle Mountain the other day after supplies, including ore sacks. Mr. Trainer says that at the present time they are extracting about 200 pounds of ore a day that will average better than \$110 per ton, and that they are breaking even on the lease, but that the indications for a body of ore grow more favorable every day and that they will certainly make a nice clean-up from their lease, they feel assured.

That the new directors of the Eureka-Croesus Mining Co. will follow a conservative plan of development and equipment of the mine on Prospect Mountain in Eureka district is evident by the reports of two eminent mining engineers, Dr. Walter Harvey Weed and George P. Hyde, both of whom are members of the directorate. The reports are strong endorsements of the value of the properties owned by the company and both engineers recommend and urge that a smelter be built to treat the product of the mine and custom ores.—Nevada Mining Press.

The starting of the new flotation mill of the Simon Silver-Lead Mines Co. in Mineral county, on the 15th was an event of far-reaching importance to the mining industry of Nevada, not only in opening to production one of the largest deposits of silver-lead-zinc ore known to exist in the mining region, but through the large-scale application of a treatment process new in this state but recognized as well-established milling practice and potentially a complete solution of ore treatment problems in the numerous Nevada districts having ore of similar character.

Coal Notes

Coal of a high grade is being delivered at Castle Dale from the new Anderson mine at \$4 a ton.

It is estimated there is coal enough in discovered fields to keep miners striking for 3,276 years.—Fresno, Calif., Republican.

Coal from Castle Gate, Carbon county, is reported to be on the Myton, Uintah county, market at \$13 to \$15 a ton. That is slightly more than Vernal coal costs, but users declare that it goes twice as far.

The H. C. Frick Coal Company fired three hundred and fifty ovens back at Greensburg, Pa., early in the month.

This is in addition to six hundred a few days previously. All have been banked in since last spring.

Fire, which broke out tonight in the surface buildings of the Monarch mine, two and a half miles south of Louisville, Colo., destroyed the tippie of the mine and caused damage the amount of which has not been estimated, according to a report received in Denver on the 15th.

Park City is to have a new coal yard. T. J. Lewis, manager of the Grass Creek mine at Coalville came up to Park City the first of the week, and has decided to supply Park City people with Grass Creek coal. The yard will be at the Daly West loading station, and Mr. L. P. McGarry has been given the contract for delivering the coal to consumers. Mr. Lewis will manage the business.—Park Record.

The newly opened coal mine at the head of North Medicine Lodge Creek, in Beaverhead county, Montana, 57 miles from Leadore, Idaho, has entered upon its initial production career, having the encouraging support of all those who earnestly desire the success of the new industrial enterprise. A carload of the mine's product reached Leadore several days since and was delivered by dealer Friedorff to a dozen or more of his customers at the price of \$10 per ton—a figure several dollars below the charge for either Utah or Wyoming coal.—Leadore Progress.

Trade Notes

The Union Construction Co., engineers and shipbuilders of San Francisco, have moved from 804 Mission to 351 California Street.

H. C. Brenchley of the Minneapolis Steel and Machinery company, was elected vice-president of The Structural Steel Society for the ensuing year at the annual meeting in Chicago.

The Utilities Co., of Grand Junction, Colorado, Joseph Stewart, general superintendent, is to spend \$25,000 in the enlargement of its municipal gas plant service. It is planned to begin work about the middle of December.

Crowley, the Magazine Man, 511 East 164th St., New York City, has just issued a catalogue containing a list of business, class, professional and technical publications with a brief, comprehensive description of the field they cover. Send for your free copy today.

The Helper Coal Company, with properties at Martin, Utah, W. A. Williams, manager, recently purchased a Sullivan drill sharpener, which will be installed as soon as delivered at the mines. This company recently shipped its first carload of coal to the Salt Lake market, the mine's product previously having been consumed by local patrons near the mine.

A booklet entitled, "Flotation," which is a brief survey of this subject by Dr. H. J. Stader, has just been issued by the Hercules Powder Co. It contains interesting information on flotation and the various oils used in the process. Dr. Stader, who is also the author of "The Flotation Process," "Interfacial Tension in Flotation," etc., is now flotation engineer with the Naval Stores Division of the Hercules Powder Company. The pamphlet is not of an advertising nature, but has been published simply to provide information to users of flotation oils. Anyone may obtain a free copy of this booklet by writing to the Naval Stores Division, Hercules Powder Company, Wilmington, Delaware.

Around the State

A few days ago a lease and bond was secured on the Grand Central mine at Tintic by Paul Hilsdale. The impression is general that the control of this proposition will go to the Chief Consolidated.

Fancesco Rospiglios of New York has started suit of foreclosure on mortgage against Glenallen Mining company with property at Park City. It is claimed that six promissory notes carry \$300,000 due, and unpaid. They are dated of Sept. 8, 1920.

Ophir Silver Mines Co., recently held its annual meeting at which directors were chosen, and later officers selected as follows: President, Guy R. La Coste; vice-president, H. W. Lane; treasurer, W. G. Goddard; secretary, Ira Tichenor; who with L. F. Adamson make up the directorate. Annual report was read and approved.

During a recent visit to Tintic Manager Hugh Trenholm of the Knight mines was accompanied by Elisha B. Carrier, an assistant attorney in the Interior Department of the government at Washington. Mr. Carrier was given an opportunity of visiting a number of the local mines and greatly enjoyed his stay in Tintic.

The Eureka-Nevada Mining Co., A. G. Burritt, secretary, 226 Dooly bldg., Salt Lake, announces a special stockholders meeting for Dec. 12, 1921, for the purpose of increasing its capitalization from 1,000,000 to 1,500,000 shares and also to vote on the authorization of \$30,000 convertible notes or bonds for the purpose of liquidating its indebtedness and operating its holdings.

For some time it has been reported that the Chief Consolidated had secured control of the Eureka Lily Mining Co. company which owns ground adjoining the Tintic Standard on the west. At a postponed annual meeting, held during the month, the consummation took place. All the old directorate resigned with the exception of R. J. Evans, who was retained. The other directors are as follows: Walter Fitch, Thos. Carmichael, and B. L. Cripps.

In an accounting held in the United States district court, the Utah Consolidated Mining Company acknowledge that it has extracted a total of 108,156 tons of lead ore from property belonging to the Utah Apex Mining Company. The original accounting showed a total of 106,600 tons, and a recalculation was made upon an order of the court following a hearing on exceptions filed by the Utah Apex. The increase, it is stated, is accounted for by ore taken from the 13-22-11 stope, an error having been made in the original accounting.

Supt. Nebeker says that sinking operations are being carried along in a manner that is most satisfactory to the officers of the Zuma company. Last week the shaft reached a depth of 950 feet and it is going down at the rate of about four feet each day. Present plans call for sending the workings on down to the 1200 level and Mr. Nebeker does not believe that sinking will stop short of that point. The showing in the shaft is promising as the drills are cutting through a lime formation in which there is an excellent chance for the ore to make.

After many years of conservative, and, no doubt, efficient management, the Godbes have finally lost control of the Prince Consolidated of Pioche. This was reflected in a meeting of the directors recently held when President Anthony H. Godbe resigned from the directorate and he was succeeded by J. E. Galigher, now president. Fred C. Dern also resigned

and was succeeded by Fred C. Richmond. This makes the directorate now as follows: Murray C. Godbe, George F. Wasson, Messrs. Richmond and Galligher and A. Thomas. The Godbes have pulled the Prince through some pretty tight places and in their day have distributed to stockholders \$575,000 in dividends.

Returns from a trial shipment of two tons of bonanza ore mined in the Woodlawn property, situated in the Big Cottonwood district, have been exceedingly gratifying, according to Manager W. J. Lawrence, who has been in the city for the past few days buying supplies for the winter campaign of exploration work. From but 3,929 pounds of ore, after all smelting, sampling, freight and wagon haulage charges had been deducted, a net return of \$698.15 was received. General assays of the ore showed the following values: Gold, \$2.83; silver, 405.117 ounces; copper, 2.0 per cent; lead, 7.35 per cent; insoluble, 39 per cent, and iron, 9.17 per cent.

Directors of the Sells Mining company have adopted a plan whereby finances for corporate purposes will be made available by disposal of the treasury stock which was created when the capitalization was recently increased from 600,000 shares with a par value of twenty-five cents to 1,000,000 shares with a par value of fifteen cents. According to the resolution it was decided to sell George H. Watson and Company, brokers, a total of 412,444 shares of treasury stock. However, it was directed that before this stock should be sold, stockholders should be given the privilege of purchasing treasury stock at three cents per share on the basis that for every three shares now owned two could be bought. This right must be exercised by stockholders on or before December 22.

Petroleum Notes

B. A. Myers is a recent addition to the ranks of the oil fraternity in Casper, having come out to take charge of the Carter Oil Co.'s Salt Creek production. His headquarters were formerly in Tulsa.

Twenty mile Oil and Gas Co., which has three or four gas wells on the Williams Park structure, Routt county, Colorado, is reported to have closed contracts with eastern parties for the erection of a plant at its wells for the manufacture of carbon black.

Senator L. E. Girard of Boulder announces the recent merger of the Colorado Shales Corporation with the Utah Shales Corporation, of which he is president. The new concern owns 1,280 acres of shale claims near DeBeque and 7,711 acres near Colton, Utah.

The works of the Alliance Oil and Refining Co. here has completed its first run of wax and asphalt with good results, both products being of excellent quality. Two new storage plants are under construction to serve this new department of the plant. The company has just placed in operation two new stills.—Mt. States Mineral Age.

Standard Oil of Indiana received an order from the Standard of New Jersey for the shipment of 2,000,000 gallons of gasoline from Casper to New Orleans, the shipment to be for the export trade. This means that over 20 tank cars will be necessary for the shipment and is the first time since early in the war that gasoline from Casper refineries has been abroad. At that time millions of gallons

Wyoming-made gasoline were shipped to Europe through the Imperial Oil Co. of Canada.

While Midwest Refining Company has holdings in Utah and is understood to have a financial interest in several of the tests being put down by Standard Oil companies, it has just contracted for the drilling of its first well in its own name. It is planning to start two wells on the Hill Creek dome, in the Uinta basin in northeastern Utah, on the holdings of the Hyland Oil and Refining Company, of Salt Lake City. This company has leases on 900 acres of school lands and 40 acres of patented land and a contract on 2,560 acres covered by a prospecting permit. One of the tests will be put down on a state lease and the other will be a prospect well on the permit land. Hyland people turn half of their acreage over to the Midwest.

The Humphreys-Mexia Oil Co.'s No. 1 Hester Ross, in the Mexia pool, Limestone county, Texas, started at 100 barrels and will make a 6,000-barrel well after the cash production is off. The same company's No. 2 on the Rogers farm, in the same pool, was flowing 500 barrels from the top of the sand. Ross and others' 10,000,000-foot strike on the Freeman Brothers' farm, in the northern part of the county, is in a new sand at 3,239 feet, lower than the Woodbine sand. Production in the Mexia pool is given as 53,425 barrels a day. There are 27 producing wells in the field, which, if opened up, would produce 75,000 barrels a day.

CRUDE OIL SURE MUSSES THINGS UP

Henry W. (Hardwinter) Davis, through his Sussex Land & Livestock Co., is suing the Midwest Ref. Co. for \$26,000 damages for allowing the waste oil to flow down the Salt Creek upon the company's lands in Johnson county. The company says in its complaint that periodically its grass became coated with oil, wool on the sheep became discolored, the legs and milk bags of the milch cows become caked with grease, and that things become generally mussed up. The company wants the Midwest to stop the oil and pay for the damages already done.

Midwest, through its lawyers, comes back with the counter charge that if the desired injunction is granted Casper will go back to a cow town, its refineries, the finest equipped in the world, will be closed down, and the United States and Wyoming will lose millions in oil royalties. In the light of this remarkable situation a correspondent suggests that the plan of the Parkerburg Rig and Reel Co. be adopted, as follows: Train the cows to feed on the crude oiled grass so that they can produce a high grade of unadorned gasoline when milked. Connect the dairy with the gasoline pipe line to Casper and market the product. Pay "Hardwinter" a royalty on all gasoline produced and give the cows a vacation three months out of the year. Even the League of Nations couldn't suggest a more satisfactory compromise.—*Wyoming Oil News*.

Copper sales for foreign and domestic account totaled 10,000,000 pounds during October. This compares with 10,000,000 in September and 75,000,000 average August and July. These sales are the largest for any month this year.

An exchange speaks of a "hotel guest who was shot in the rotunda," notes another exchange, adding that such a thing couldn't happen in Eureka. The only man in town who had a rotunda has lost it playing golf.

Personal Mention

Frank L. Sizer, San Francisco mining engineer, was recently in Elko county, Nevada, on an examination trip.

H. Kenyon Burch has returned to Bisbee after recuperating from an operation which he recently underwent in Los Angeles.

Horace V. Winchell has recently been doing consulting work for the Chief Consolidated Co., at Tintic. He has returned to New York.

L. D. Gordon, president of the Round Mountain and Fairview Mining Co.'s, has returned to the San Francisco office after spending a month at Round Mountain.

E. F. Nieman and J. F. Inglis, of Salmon, Idaho, have recently completed an examination of the Bluster and Success groups at Jarbidge, Nevada, for Salt Lake and Chicago interests.

Ben G. Hite, well-known mining writer, and of recent years, mining promoter, who moved to San Francisco a year or so ago, has decided there is no place like Salt Lake, the "old home town". He is back to stay this time.

After an absence of several months, during which he made a trip to Germany and also spent some time in Fremont, Nebraska, from whence he originally came to Utah to make a fortune in mining, John Dern returned on the 15th. It is distressing to report that Mr. Dern is now confined to his home with a serious attack of heart trouble, from which his legion of friends hope for a speedy recovery.

A. S. Ross, president and general manager of the Wilbert Mining Company, which now is preparing for an extensive campaign of production from its Idaho mines, was in the city recently after a trip to the properties. He has returned to New York on company business.

D. C. Jackling, vice-president and managing director of the Utah Copper Co., was in Salt Lake on one of his periodical visits about the middle of the month. He has been at the Nevada Consolidated and, before returning to San Francisco, he will have also visited the Ray and Chino. "Getting ready for spring resumption" may be accepted as the verdict.

W. S. Elliot, the well-known Nevada and Utah mining operator, who is proud to claim Ely as his real "home town," was in Salt Lake for a day or two about the middle of the month on his way back to Ely from a general scouting trip around the country. He figures on "hibernating" until spring rolls around again at his Great Northern hotel.

Henry F. Crittendon, adjutant of Salt Lake post No. 2, American Legion, resigned his position about the middle of the month, to become associate editor of the Tonopah Bonanza. Mr. Crittendon has had considerable experience in newspaper and magazine work, and will make a valuable addition to the Bonanza staff.

If you survive another few years you may have your curiosity satisfied as to the kind of people who exist on the planet Mars. A body of astronomers will use an abandoned mine in South America for the purpose of constructing a powerful telescope 1,300 feet in length. This telescope will reach from the bottom of the shaft to the surface of the ground, and is sufficient to bring Mars within a mile and a half of the earth. We may even be able to settle the mooted question as to the length of the skirts Martian women wear. Don't die yet.

BOSTON-ELY MINE MANAGEMENT ORDERS DEVELOPMENT SPEED-UP

Because of reports that have been sent east, and which reached New York during the last week from Raymond Guyer, consulting engineer for the Boston and Ely Consolidated Mining company, and S. M. Soupcoff, field engineer for the American Smelting and Refining company, the local management of the Boston and Ely has been instructed from the New York office to increase the working force, and this will be undertaken during the coming week, says the White Pine News of the 20th.

The force now consists of thirteen men, working one shift. Commencing tomorrow this force will be increased and two shifts will be worked. It is estimated that the force will be increased to thirty or forty men.

The development in the shaft continues to be encouraging, having apparently an immense body of limonite containing copper, and the opinion of the visiting engineers is that operations are now on top of a big ore body.

The shaft has reached a depth of ninety-eight feet. At the 100-foot level crosscuts will be driven east and west to determine the result of the limonite zone.

It is the intention of the management to continue the shaft 200 feet or more and connect the same with the tunnel level. The vertical distance between the tunnel and the collar of the shaft is 294 feet and the distance horizontally 375 feet.

Those conversant with the general situation of the Boston and Ely mine express surprise at the fact that close to 20,000 tons of commercial ore have been developed, having an average assay value of 6 per cent copper, as well as at the immense amount of development machinery purchased, buildings erected and general mining equipment, all of which has been paid for out of the original \$200,000 working capital with which the company started and of which approximately \$100,000 still remains in the treasury. This is certainly an excellent showing when it is further considered that the development has produced a gross value of \$352,000 in sight.

From recent correspondence received from the company's New York office it appears that the directors are perfectly satisfied, and well they should be, as there now remains only one thing to place the Boston and Ely Consolidated among the big producers of this great copper district, and that is the return to normal of mining conditions, freight rates and other matters which are necessary to take into consideration in the handling of ore from mine to market.

On the Ely Northern ground, now owned by the Boston and Ely Consolidated Mining Company and located on the southern side, so far as exploited, not one-tenth of the ground has been prospected. There are portions of this property on which little or no work has been done where the surface showings are equal to any found in the Ely district.

That the Boston and Ely is a big mine all who have visited the property recently, and are in position to know, agree. The management is to be congratulated and is deserving of great credit for the activity which it is showing which beyond all question of doubt will place this property, located within a stone's throw of the city of Ely, among the big producers of copper ore the moment that normal conditions return.

And what has become of the old-fashioned girl who used to dance with her feet?

ANACONDA'S NEW COPPER SHINGLE PERFECTED.

Further experiments by the Anaconda in connection with the manufacture of metallic shingles, made up of an alloy of copper and zinc, have resulted in increasing the size of the product to a length of six feet, it being believed that this enlarged size will appeal to constructors as a time saver on roofing jobs. The Anaconda has tried out the use of zinc sheets for roofing and while these have stood up remarkably well they are not to be compared with those of copper, tried out upon one of the converter buildings at the Washoe reduction works, and by making a shingle of an alloy of the two metals it is thought the ideal material has been developed. By the addition of copper to the shingle a thinner plate is possible.

The Anaconda has in mind certain improvements to be made at its electrolytic zinc plant at Great Falls, Mont. according to an address made to the American Zinc Institute by Frederick W. Laist, metallurgical manager for the Anaconda, in which he said that the plans roughed out would result in better recovery, better current efficiency and lower operating and plant costs.

The Anaconda's plant at Great Falls is probably the largest zinc plant of any kind in the world today, according to Dr. Laist, the capacity of which is rated at 110,000,000 pounds of zinc per annum from concentrates carrying copper, but on the basis of copper-free concentrates, such as are had in the Joplin district, the capacity would be still larger.

The record monthly production for the plant was made last July when a total of 11,801,662 pounds of zinc cathode were drawn. The recovery at the Great Falls plant is 80 per cent approximately. With the grade of the zinc concentrates running from 50 per cent to 55 per cent, the recovery is higher, and on high grade concentrates like those of the Joplin district a recovery of 92 per cent to 95 per cent can be had.

Dr. Laist spoke of copper costs seldom being below 15 cents a pound, and from this is had the inference that approximately this figure represents the metal per pound cost of the Anaconda.

ELECTROTHERMIC ZINC SMELTING.

An investigation of the electrothermic smelting of zinc and the condensation of zinc vapor is being undertaken at the Mississippi Valley experiment station of the Bureau of Mines at Rolla, Mo., in cooperation with the Missouri School of Mines and Metallurgy. A critical study of the physics and chemistry of the condensation of zinc vapor will be made for the purpose of obtaining sufficient data to design a condenser for an electric furnace which will result in the elimination or diminution of the formation of blue powder. At a later date there will be published a bulletin reviewing the development of the electrothermic metallurgy of zinc, which will contain a bibliography of the subject and a resume of the various types of electric furnaces applicable to the zinc industry. The investigation, which will be under the general direction of Dorsey A. Lyon, chief of the metallurgical division of the Bureau of Mines, will be undertaken by Dr. C. H. Fulton, consulting metallurgist, B. O'Harra, assistant metallurgist, William Kahlbaum, cooperative chemist, and Clarence W. Burkhart, fellow in electro-metallurgy.

Another investigation to be undertaken at the Mississippi Valley experiment station, in cooperation with the Tennessee State Geological Survey, will be to determine

whether the zinc ores of Hancock County, Tenn., are possible of concentration. George J. Salmon and Will H. Coghill, metallurgists of the Bureau of Mines, have been assigned to this investigation. M. H. Thornberry, state research metallurgist, William Kahlbaum, chemist, and Elmer List, fellow in ore dressing, will assist in the investigation.

At the North Central experiment station of the Bureau of Mines, at Minneapolis, a critical study of the methods of analyzing iron ores at Minnesota mines has begun. At the suggestion of several operators, it is proposed to compare various laboratory methods used at these mines in the determination of different elements in iron ores, after which a comparison of results will be made. At a later date a paper, giving the results of the investigation, will be published by the Bureau of Mines.

COPPER LEDGE UNCOVERED BY SHEEP.

Many and peculiar are the ways in which mines have been discovered, and these will probably be multiplied so long as the necessities of man require the constant search for metals. So far as known the jackass that kicked the capping off the Bunker Hill & Sullivan ledge and exposed glittering galena is the only dumb animal that is credited with discovering a great mine, but this distinction may soon be shared by the simple-minded sheep, according to an interesting story that comes from Superior, Montana.

Warned by the snow on the higher peaks, a faithful sheep herder who had taken his flock to the head of Cedar creek for summer range, a few days ago rounded up his herd and headed them for a lower altitude. Following along listlessly, his dog doing the real work, his eye was attracted by a rock of unusual color and he picked it up for a closer examination. Even his untrained eye quickly recognized it as mineral. He had not proceeded far when he met a prospector, William Whitmarsh, to whom he exhibited the ore. Whitmarsh was interested and upon inquiry was told by the sheep herder that the sheep had turned it up a short distance back as they clambered along the mountain side.

They went back to the place and in a few minutes Whitmarsh had exposed the ledge 10 or 15 feet wide with copper ore, chalcopryite, all through it, samples of which, such as that exposed by the sheep, carrying 20 per cent copper. The ground was promptly located and since that time Mr. Whitmarsh has exposed similar showings on the vein for a distance of 400 or 500 feet. The discovery is on Cedar creek, about four and a half miles from Superior, and within a few hundred feet of a good wagon road.

REDUCTION MILLS IN WESTERN STATES.

In 1912 an investigation was made by the United States Geological Survey as to the number of reduction mills in the various western states, with details of their equipment, and the results were published in the Mineral Resources report of that year. The present list was compiled by Charles G. Yale, V. C. Heikes and Chas. W. Henderson of the U. S. Geological Survey, and is being published by the U. S. Bureau of Mines for the benefit of the industry.

Strict accuracy in details is not claimed for the present list of reduction mills, as in the limited time at disposal it was not always possible to send for corrections or additional information. The list, however, may be considered a revision of that of 1912.

The figures of daily capacity include those of the direct milling, tailings, cyanide, flotation, and smelting plants.

While gold dredges are not considered as reduction plants in the lists given yet they really perform that function, not only of digging the gravels, but of concentrating and separating the gold therefrom, and may be considered the most important of the mechanical appliances of placer-gold mining. There were 40 of these dredges operating in California in 1920, and 4 in Oregon, 3 in Idaho, 3 in Montana, and 1 in Nevada.

For purposes of economy, the list for each state has been bound separately and given a subtitle, and the following are available:

Serial	
2287—A	California
2287—B	Oregon
2287—C	Washington
2287—D	Idaho
2287—E	Utah
2287—F	Montana
2287—G	Nevada
2287—H	Arizona

Copies of these may be obtained by writing to the Director, Bureau of Mines, Washington, D. C. Lists for other western States will also be published by the Bureau of Mines as soon as these are available.

TRACTOR DISPLACES "20-MULE TEAM."

A few years ago no home was complete, says the Clark County, Nevada, Review, without a package of "20-Mule Team" borax, which was supposed to do everything to clothes that "Candy Cathartic Cascarets" are supposed to do while you sleep. "Borax" (F. M.) Smith was the man who made "20-Mule Team" borax famous. Then he had some bad luck while the borax went on its way.

Lately there was discovered near Las Vegas an immense deposit of borax. "Borax" Smith was supposed to be down and out. But the old head was working, to the surprise of many fledglings in the game doing things, and this same Smith succeeded in financing a new borax field that is likely to make the old one look like the overworked 30 cents or a thin dime.

The result is the West End Chemical company, which is now developing the property, this week is bringing in modern methods of transportation to replace the reliable, unappreciated and much maligned mule of not so very long ago.

Wednesday the West End Chemical company received a 65-horsepower Linn tractor with an accompaniment of four trailers, with a capacity of four tons each, which ought to make twenty mules blush, if mules do that.

The manager states that the company will start hauling borax from the Anniversary mine within the next ten days. The product will be loaded into the ore bins at "Gravel Pit" about twelve miles northeast of Las Vegas, and shipments will be made from there to their refinery at Searle Lake in San Bernardino county, California. The tractor and trailers will make a daily round trip between the mine and "Gravel Pit" on the Salt Lake route, hauling twenty tons of ore each trip.

Resembling a small piledriver is a machine invented by a Detroit engineer to cut trenches through the thick-set concrete streets when pipes are to be laid.

SALT LAKE MINING STOCK QUOTATIONS

The range of the market from November 14th, 1921, to November 25th, inclusive. Quotations furnished by J. A. Hogle & Co., direct wires to all leading markets, 169 So. Main St., Salt Lake City, Utah, ground floor of Eccles Building, Ogden, Utah, and Pocatello, Idaho.

Stock.	CLOSING					CLOSING				
	Open.	High.	Low.	L. S.	Bid.	Open.	High.	Low.	L. S.	Bid.
Antelope Star										
Alta Con.										
Albion Cons.										
Am. Con. Cop.	.013	.013	.013	.013	.05	.013	.013	.013	.013	.013
Alta Tun.	.12	.13	.11	.13	.12	.13	.13	.13	.13	.13
Addie					.02	.30				
Bell Silver	.54	.62	.52	.62	.62	.63				
Bullion	.023	.023	.02	.02	.013	.05				
Big Hill					.01	.06				
Big Cot. Coal.	.033	.043	.033	.043	.04	.01				
Beaver Cop.					.10					
Bay State					.12	.17.50				
Black Metals	.13	.13	.11	.11	.10	.12				
Bingham Gal.	.053	.053	.043	.043	.043	.05				
Cent. Eureka					.02					
Colb Rexall	.14	.14	.14	.14	.13	.14				
Colo. Con.	.013	.013	.013	.013	.03	.38				
Crown Point	.03	.033	.03	.033	.03	.04				
Cardiff	.95	.95	.82	.82	.75	.88				
Croff					.01					
Cott. King										
Daly	1.00	1.00	1.00	1.00	1.00					
Daly West	1.70	1.70	1.60	1.60	1.50	2.00				
Dragon	.033	.033	.033	.033						
Emma Silver										
Empire Mns.	.02	.02	.02	.02						
East. Prince					.01					
E. & B. Bell					2.25					
Emerald					.013	.02				
Eureka Mns.	.04	.04	.04	.04	.033	.043				
E. Crown Pt.	.02	.02	.02	.02	.02	.023				
E. Tin. Coal										
E. Tin. Con.					.06	.09				
Eureka Lily					.05	.073				
Eureka Bul.	.043	.043	.03	.03	.02	.03				
Gold Chain						.09				
Grand Cent.					.21					
Hamb'g Mns.										
Howell	.053	.053	.05	.05	.043	.06				
Home Run					.01					
Iron Blossom	.15	.18	.15	.18	.16	.20				
Indian Queen										
Iron King					.04					
Judge M. S.					2.00	3.00				
Keystone					.10	1.00				
Kennebec										
Lehi Tin.	.013	.023	.013	.023	.02	.09				
Leonora	.013	.013	.013	.013	.013	.013				
Logger										
Lynn Big Six	.033	.09	.033	.09	.07	.09				
Monzonite										
Mammoth										
May Day					.01	.50				
Mich. Utah	.083	.083	.07	.073	.073	.08				
New Quincy	.073	.083	.073	.073	.073	.08				
Naildriver	.01	.023	.013	.023	.13	.20				
No. Standard					.023	.03				
O. K. Silver						.02				
Ophongo					.10	.20				
Plutus					.053	.07				
Prince Con.										
Paloma										
Pioche Bristol		.01	.01	.01						
Prince Mng.	.04	.05	.04	.04	.033	.043				
Provo	.013	.013	.013	.013	.013	.013				
Rico Arg.						.02				
Rds Pk Cons.						.02				
Rico Well										
So. Standard	.12	.12	.12	.12	.12	.15				
Sells	.02	.02	.02	.02	.02	.03				
Syndicate										
Sil. King Coal	2.073	2.25	2.073	2.25	2.20	2.30				
Sil. King Con.	.63	.65	.52	.53	.52	.56				
Swansea Con.					.01	.03				
So. Hecla					.20	.50				
Silver Shield	.043	.05	.04	.04	.04	.043				
Tecoma										
Tar Baby					.013	.023				
Tin. Central						.02				
Tin. Standard	2.00	2.00	1.973	1.973	1.95	2.00				
Uncle Sam						.01				
Utah Con.										
Union Chief						.043				
Victor Con.										
Victor Mng.					.01					
Woodlawn	.06	.06	.06	.06	.053					
Yankee Con.					.01					
West Toledo	.023	.023	.023	.023	.023	.023				
Zuma	.033	.04	.033	.033	.033	.04				
Walker Mng.	2.70	2.70	2.523	2.523	2.50	2.90				

ORE SHIPMENTS

During the two-week period ending on the 25th the mines of Park City shipped 4,453 tons of ore, as follows:

Judge Allied Mines	1,918
New Quincy	50
Ontario Silver	816
Silver King Coalition	1,669
Total tons	4,453

Ore shipments from the Tintic district for the two weeks ending on the 25th amounted to 336 carloads, as follows:

Tintic Standard	101
Chief Consolidated	90
Victoria	33
Dragon Consolidated	30
Iron Blossom	23
Eagle & Blue Bell	15
Swansea Consolidated	7
Centennial-Eureka	10
Grand Central	6
Gemini	2
Tintic Drain Tunnel	1
Colorado Consolidated	5
Empire Mines	4
Bullion-Beck	3
Mammoth	2
Sunbeam	1
Eureka Mines	1
Castelman (lease)	1

Total carloads336

DIVIDEND ANNOUNCEMENTS

Iron Blossom Mining Co., of Tintic, has declared a dividend of 2½c. a share, aggregating \$25,000. It will be disbursed December 20th to stockholders of record on the 10th. This payment will bring the grand total up to \$3,300,000 or \$1.30 a share. The last previous disbursement was made in January, 1920.

The Eureka Hill Mining Co., also of Tintic, paid a dividend of \$10,000 or \$1 a share on the company's capitalization of 10,000 on the 15th. In recent years the revenue of the Eureka Hill Company has been limited to royalties from leasers in the mine and rentals from the sale of water.

The American Smelting & Refining Company has declared the regular quarterly dividend of 1¼ per cent on its preferred stock, payable December 1 to stock of record November 14.

ASSESSMENTS PENDING

Emma Silver Mines Co., ¼c. a share. Delinquent December 10. Sale day January 4.
Utah Zinc Company, 10c. a share. Delinquent December 19. Sale day January 11.

METAL MARKET QUOTATIONS, NOVEMBER 25

Silver	99¼c.
Silver in London	37½d
Copper	13½ @ 13¾c.
Lead	\$4.70
Zinc	\$4.70

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The Salt Lake Mining Review

VOL. 23 NO. 17

SALT LAKE CITY, UTAH, DECEMBER, 15 1921

SINGLE COPIES, 15 CENTS

The New Concentrating Mill of the Silver King Coalition Mines Company

By Arthur O. Gates*

The Silver King Coalition Mines Company, at Park City, is now rapidly completing the new concentrating mill to replace the old mill which was totally destroyed by fire on January 27, 1921.

This new mill presents no striking or extremely novel features, but is rather the embodiment of the best practice of the Park City district, as gradually developed during twenty-six years' experience in treating these ores. However, advantage was taken of the opportunity to incorporate mechanical and constructive features which were unknown or unproved when the original mill was built, and to make such changes in the flow-sheet as experimental work carried to completion just previous to the fire had indicated as improving operations.

The new plant is thoroughly modern, designed for low operating and low maintenance costs, for economical extraction of values, and for the comfort and efficiency of the millmen.

No questions of mill-site were seriously considered in connection with this new plant. The old site was utilized; it was close to the mine, involving a very short haul for the mine cars which are loaded underground and hoisted; it was close to the company's aerial tramway which carried the company's smelting ores and concentrates over the mountain to the railroad yards of Park City and which carries back coal and supplies. There is a plentiful supply of water available, and the sloping hillside gave the fall considered necessary for mills of this type, and the disposal of tailings is adequately provided for.

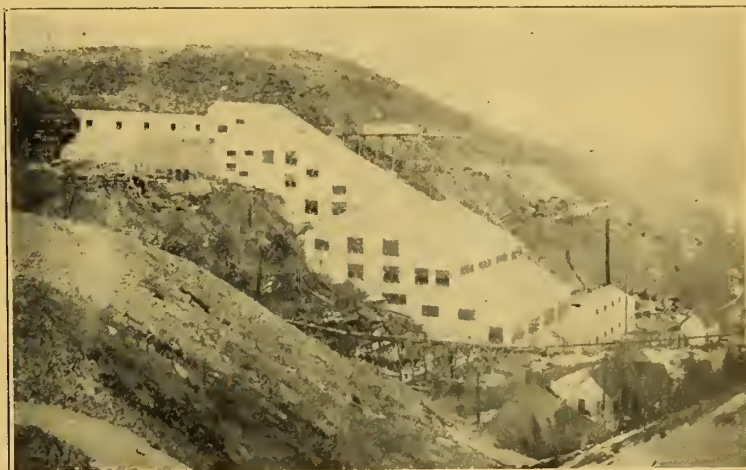
Steel and Concrete Construction Throughout

The new building is of steel and concrete construction throughout, with galvanized corrugated roofing and sides, the walls and floors being of reinforced concrete, and presents a very attractive appearance. The ore bins are of heavy reinforced concrete construction, of very large capacity as required for their conditions; the general type of this construction is shown in the illustrations. All concrete walls have been brush-coated with cement which smooths out form irregularities and greatly improves the appearance of this work. The rock and sand for concrete came from the mine, the sand being nearly pure silica coming from a fracture zone and screened before using.

The lighting of the plant is particularly good, numerous windows being well placed for getting the daylight to where it can be best utilized. One who has been in the older wooden mills of the district (including the mill which burned down on this property) will appreciate the

wide diffusion of unobstructed daylight throughout the plant, as compared with the old mill's obstructed light diffusion, caused chiefly by large wooden posts and the rather inefficient dormer windows built into the sloping roof.

By utilizing simpler, heavier and more modern machinery, the new mill will contain a plant capacity of 450 tons per 24 hours, in about one-half the floor space of the older mill which had a capacity of about 250 tons per 24



General View of the Silver King Coalition Mines Company's New Milling Plant

hours. Launder distances are shorter and there is more room for the handling of repairs.

Character of Ores and Methods of Handling

The ores of this property come from limestone beds (Park City formation), the gangue material being silicious limestone of various percentages of silica. During 1920, about 14,500 tons of first-class ore was produced which went direct to the smelter and was sold for approximately \$800,000; in the same period about 25,000 tons of second-class ore was milled to produce about 4,500 tons of concentrates which sold for approximately \$200,000. The ratio of concentration has been about 5.5 to one.

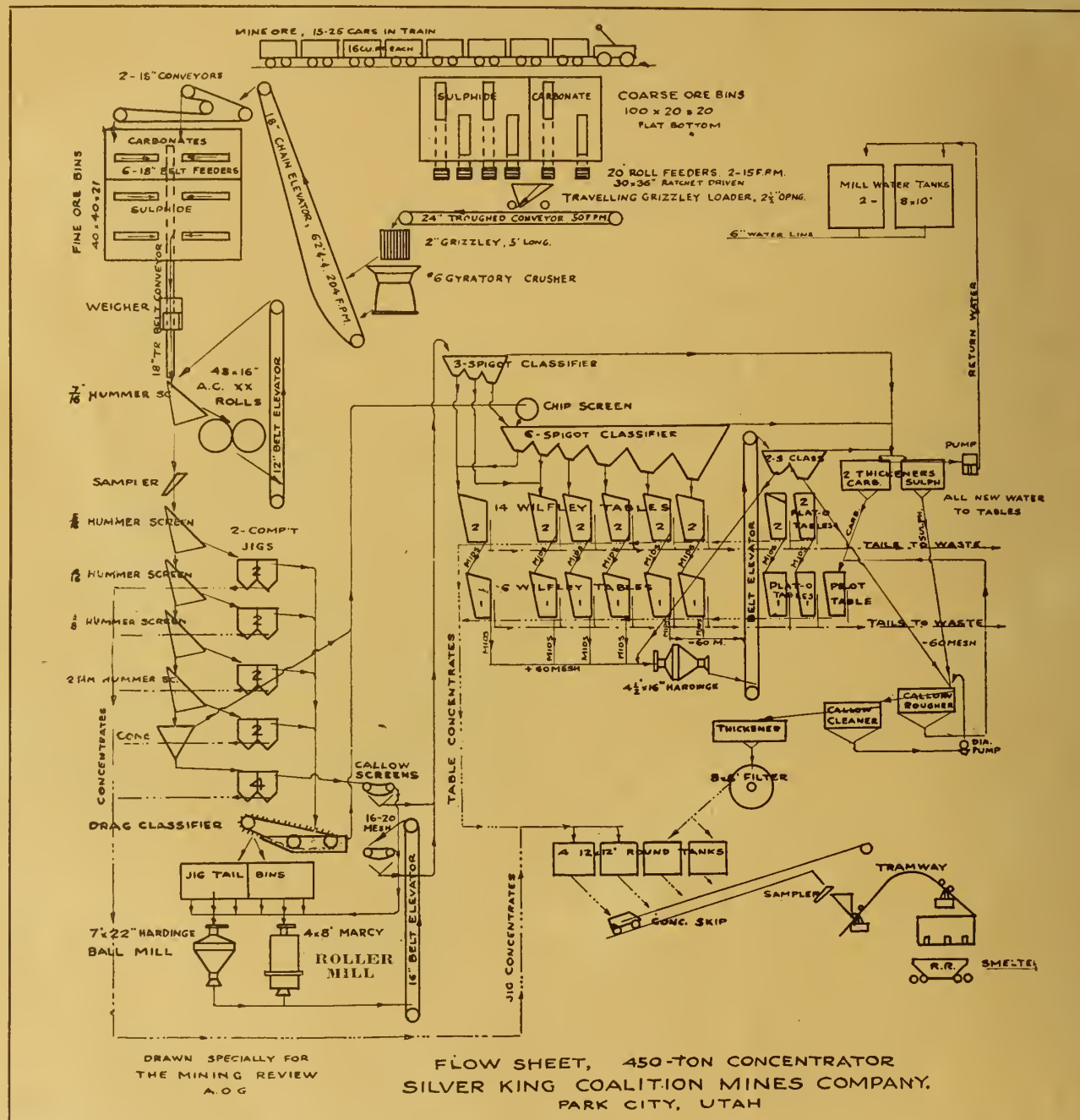
Of the second-class, or milling ores, about two-thirds are sulphide and one-third carbonate. The ores are sorted underground and again in the coarse crushing section of the mill, where the large pieces of first-class ore and of waste are picked from the conveying-belt. It will be noted in the flow-sheet that the sulphide and carbonate ores are kept separate in both the coarse and fine bins; it is neces-

*Mining Mechanical Engineer, Salt Lake City, Utah.

In a portion of the company's annual report given later

ore, and as this is fairly self-explanatory detailed explanation of the various steps in the process is hardly necessary; some points, however, in connection with the flow-sheet may be of interest.

Under the fine ore bins are steel chutes leading to the 18-in. belt feeders; the chutes open the bottom of the bin almost the full length of the feeder; in order that the full weight of the ore over the long slot may be taken from the belt of the feeder, there is a slot in the side of the chute through which may be inserted spiles of 2x4-in. timber continuously or in part so that the belt is relieved from weight



Some of the Flow-Sheet Features Explained

The flow-sheet accompanying this article shows the various machines and their part in the beneficiation of the

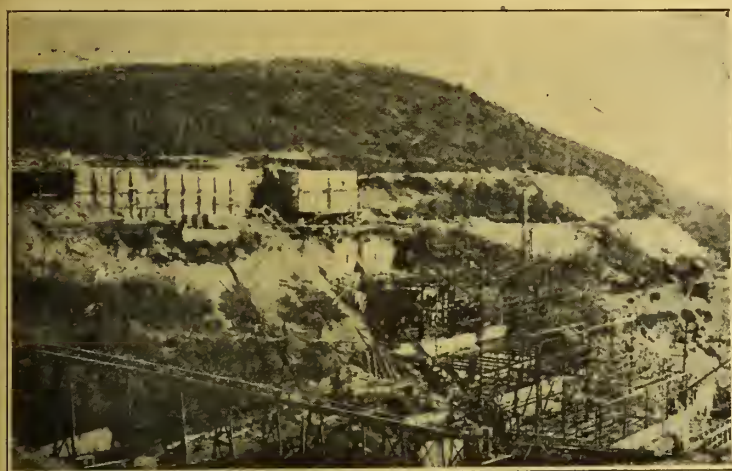
and wear, but the feed may be taken from any portion of the bin along the feeder slot. It is probable that some saving in power is affected along with the saving in wear by this arrangement.

The large number of feeder openings in both coarse and fine ore bins and the arrangement of these openings is such that the bins can be emptied with very little hand labor.

The decision to use a gyratory crusher instead of a Blake was made upon the basis of certain desired conditions which were laid down to begin with, and it was found

that the gyratory gave the greater capacity of a given product than the Blake which could crush down to the small size to which it was desired to go in this first crushing operation.

A Merrick conveyor-weigher is attached to the belt which conveys the ore from the fine ore bins to the first sizing screen. The weight is recorded upon a dial similar to a gas meter from which it is entered upon the records at stated intervals. Part of the belt conveyor (two or three rolls) is carried by the platform of the scale; a pulley in contact with the belt gives the necessary rotation to the mechanism; a small flat belt driven from the above is in contact with rollers placed in the periphery of a disc.



Reinforced Steel Ore Bins—Coarse, Fine and Jig Tailing Bins. Also Skeleton of Mill Building

When there is no load to deflect the scale-beam the belt on these rollers does not move the disc, but as soon as load comes to deflect the scale-beam the disc is deflected and the movement of the belt on the rollers rotates the disc and the amount of rotation, translated into tons, is what the disc records on the dial.

Crushing and Jigging Features

The Allis-Chalmers XX rolls are very massive in appearance with long bearing surfaces and large lubricating pockets. The full mill capacity demands of these rolls between fifteen and thirty tons per hour, depending upon how much of the crushed product passes the 7-16-in. screen, and how much is circulated as oversize from the same screen. The theoretical capacity of these rolls crushing to $\frac{1}{2}$ -in. is about 150 tons per hour at 67 r. p. m., at which it runs. It was decided to use larger rolls than might be considered necessary to keep down the cost of steel and the delays incident to changes of steel and other repairs; this is in keeping with the general practice of the larger milling plants.

Following the rolls with their 7-16-in. screen, and just before jigging, the ore is sampled for the head-sample. This is the logical place for sampling, when the material is at its smallest size before any separations of mineral from gangue are made; for the smallest reliable sample can be taken at this point.

The screen trommels which had been standard at Park City for years have been discarded in favor of the inclined vibratory screens, which have become popular in the last few years. The Hummer type was adopted, in which the screen cloth is vibrated back and forth by means of an alternating current magnet.

The jigs are of the Hartz type, and will be built along the lines of the jigs formerly used, which were satisfactory. All jigs are to have two compartments, the first pair will

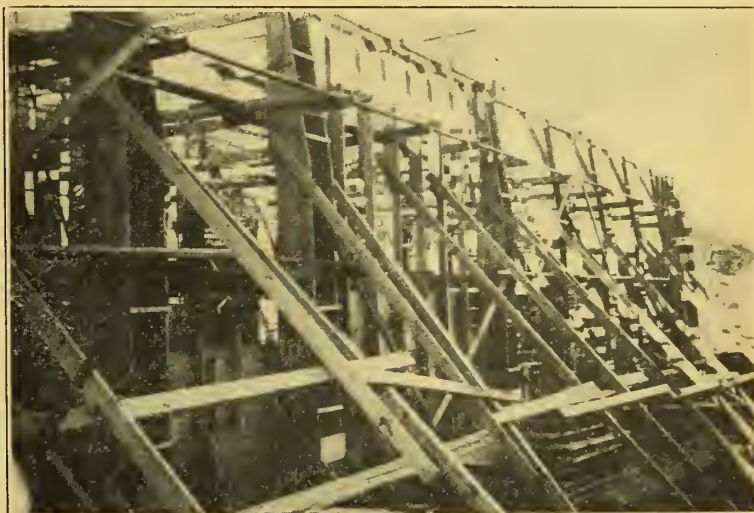
have side discharge, the balance will discharge through the hutch. They will be in groups of two handling the same product, except that there will be a group of four treating the finest jig feed (from the cone shown on flow-sheet). The speeds, strokes and jig screen sizes as used in the old plant will be closely followed, which were as follows:

No.	R. P. M.	Stroke	Screen
2	135	$1\frac{1}{4}$ "	3 mesh
2	180	$\frac{3}{4}$ "	4 "
2	220	$\frac{5}{8}$ "	5 "
2	240	$\frac{7}{8}$ "	6 "
4	240	$\frac{1}{4}$ "	6 "

Mill is Sectionalized Horizontally

One feature of Park City practice deserves comment, and that is the use of jig tailing bins which provide storage and control of feed to the regrinding machines. It might be noted here that this mill is sectionalized "horizontally," that is there is a coarse crushing unit with bins following, a roll-and-jig section with bins following, and a regrind-and-table section with auxiliary flotation for part of the ores. In a mill of this size there would be little advantage of two or more sections "vertically sectionalized." The advantage of being able to shut down to half capacity would be offset by the greater number of concentrating tables and other units required to give the treatment on closely-sized products. With the bin arrangement it is possible to operate any horizontal section, during temporary shutdown of other sections, at full capacity and at maximum efficiency. It is expected that the roll-and-jig section will be augmented by an additional set of rolls in parallel with the other set, only one to be used at a time.

The drag classifier, or dewaterer, replaces the old paddle wheel dewaterers which were satisfactory in the older and smaller mill. This drag is of the familiar type, with



Reinforcing in Concrete Ore Bins, Before Pouring Concrete

angle-iron bolted at intervals to belt; it will have larger capacity both in dewatered jig tailings and overflow than the older machine.

The hydraulic classifiers are of the familiar spitzkasten type with special hydraulic discharge boxes developed by the Silver King operators. A short length of pipe from the bottom of the wood box carries at its lower end the usual wood spigot; surrounding it is a cast-iron box into which the hydraulic water is introduced; this water goes into the pipe or neck of the classifier through a small nozzle placed tangentially and pointed upwards at an angle of about 15 degrees; the effect of the swirl is very evident on the surface of the water above; it is through this rising

swirl that the coarser particles fall. The screen analyses of products from a six-compartment classifier used in the test work in the old mill indicate the good character of its work.

SCREEN ANALYSIS OF CLASSIFIER PRODUCTS

Spigot No.	1	2	3	4	5	6
Plus 20 mesh	4.5	1.0	0.1	6.5	0.8	0.1
Plus 60 mesh	81.0	62.0	28.1	6.5	0.8	0.1
Plus 100 mesh	9.7	21.0	35.1	29.5	18.2	6.4
Plus 200 mesh	3.3	12.0	27.8	40.0	55.0	57.7
Minus 200 mesh	1.5	4.0	9.0	24.0	26.0	35.8

Callow traveling belt screens which were found satisfactory in the old mill will be used with the closed circuit in connection with the regrinding mills. They give efficient separation of the oversize from the undersize in the sizes and capacities required in these operations.

Table Work and Fine Grinding

About the only feature in connection with the table work which might call for comment is the elimination of classifiers between groups of tables for division of the first table middlings into sizes for retreatment; now the middlings from two tables which have the same feed go to a third table which retreats these middlings. Plat-o and Wilfley tables are used; the flow-sheet shows a small group of tables the use for which is not exactly determined, but which will be used either with those grouped from a given spigot, or for other purposes as the operator finds advantageous. The "pilot" table shown has no function as a gravity concentrator other than to indicate or "rough assay" the character of the work on the flotation machines; it is not expected to make a saving.

Two types of fine grinding machines have been installed for preparing the jig tailings for treatment upon the tables and flotation apparatus. The company expects to make comparative tests upon these two machines; cost per ton of ore ground, and character of the product (slime, etc.) being the most important considerations. On account of the competitive nature of these tests it is not desirable to discuss the machines, their similarities and differences, etc., at this time, but to leave that for future publication.

The writer of this article, who is somewhat known in connection with a method of crushing analysis which has been used by a number of operators, rather hesitates to pass the subject of these tests without comment: these tests are to determine which of two machines is most applicable to the conditions which will prevail in the Silver King mill, and which may or may not be applicable to other milling conditions. There is the matter of capacity, of water, of the screen analysis, of feed and discharge, of the undersize-in-the-oversize of the circulating feed; of the toughness or hardness of the ore and the capacity at maximum efficiency of the combined mill and auxiliaries upon those particular ores.

In connection with the fine grinding machines, space has been provided for additional machines, as well as additional sizing or classifying apparatus, in the event of future developments either in the mine or in the art of concentration, or flotation particularly, making it advantageous to completely or partially slime the ore. It seems hardly possible that any scheme of fine grinding with flotation is going to do better work upon the coarse grains of mineral which are now saved in jigs; in any event, the increased use of fine grinding machines all through the mining industry may show a way whereby better results may be obtained through additional grinding.

Flotation Plant Simple—Distribution of Recoveries

The flotation plant will be comparatively simple, as it is expected that not over 10 per cent of the extraction will

be made in this department, in only treating those slimes from sulphide ore which cannot easily be caught upon the tables. A Callow rougher cell, a Callow cleaner cell, with the auxiliary apparatus for thickening and circulating, filtering and loading the concentrate, and "pilot" table to indicate the character of the work being done, together with a small grinding mill to reduce the "plus 60-mesh" table middlings to flotation sizes; these constitute the contemplated flotation unit. It will not be installed until the balance of the mill is in operation.

The distribution of the recoveries in the mill is interesting, the following being based upon the test results obtained in the old mill: Out of 100 tons of mill feed, of sulphide ores, 56 tons, plus 20 minus 7-16-in. goes to the jigs, from which 12.7 tons of concentrates are produced, leaving 43.3 tons to go into the jig tail bins to be reground. 35 tons of minus-20-plus 150 go to the sand jigs, most of which goes on to the classifiers, after removing concentrates and 9.3 tons of coarse material which is added to the feed of the regrinding mills. The 9 tons of minus-150, called "slime", is augmented by 5.8 tons of slime from the fine grinding mills, making a total of 14.8 tons of slime to be treated. The table concentrates amount to 5.0 tons, and the slime concentrates to 3.5 tons; the total concentrates 21.2 tons per 100.

Milling Operations Analyzed

In connection with the 1920 annual report of the Silver King Coalition Mines Company the following rather interesting figures on milling costs are taken from the report of Forrest Mathez, superintendent, to the general manager:

MILL OPERATING COSTS

Tons milled	Tons Conc. produced	Total Cost	Cost per ton
25,103.9	4,568.46	\$59,125.34	\$2.35

MILL RECOVERY—TONS MILLED

Tons milled	CONTENTS		Tons	CONTENTS	
	Oz. Ag.	Lbs. Pb.		Oz. Ag.	Lbs. Pb.
Sulphide . . . 15,987.5	84,723.4	2,465,849	3,541.8	65,041.1	1,849,557
Carbonates . . 9,116.4	58,961.2	1,018,856	1,026.7	32,804.2	619,600
Total 25,103.9	143,684.6	3,484,705	4,568.5	97,818.3	2,469,157

	Ratio Concentration	Ag. Saving	Pb. Saving
Sulphide	4.51 to 1	76.8%	75.0%
Carbonate	8.89 to 1	55.3%	60.8%
Average	5.49 to 1	68.1%	70.9%

The above figures are based upon actual concentrates shipped to the smelter in 1920. In addition to the concentrates shipped to the smelter a "middling" product was made which was afterward marketed; this had the effect of increasing the extraction upon the sulphide ore to about 81 per cent.

It should be further noted in connection with the above figures that the daily run of the old mill was about 70 tons per day, which in a mill capable of handling 250 tons per day, has the effect of increasing the cost per ton by putting overheads upon a much smaller tonnage; in addition there was the additional expense involved in starting up, cleaning up, etc., all of which kept costs up. Shortage of mine and mill labor was the reason for the small tonnage milled.

This new mill will have about 350 h. p. of motors connected, of which the four large motors on the rolls, crusher and fine grinding mills are of the wound-motor type, for ease in starting without the use of friction clutches. On the basis that a single fine grinding mill will be in operation at a time, and allowing for margins of safety on some of the motors, the power requirement appears to be about one-half horse-power per daily ton. This is small compared with some mills, but it should be noted that those high power

mills do very fine grinding, whereas in this plant there is little fine grinding necessary.

* * *

Equipment for this plant has been furnished as follows: Crusher and Rolls, Allis-Chalmers Mfg. Co.; Ball Mill, The Harding Company; Marcy Roller Mill and Wilfley Tables, Mine & Smelter Supply Company; Hammer Screens, W. S. Tyler Company; Diester Plat-o Tables, Stimson Equipment Co.; Callow Screens, Galigher Machinery Company; Callow Flotation Cells, General Engineering Company; Steel Building, J. J. Burke & Co., Engineers, and the Kansas City Structural Steel Company; Concrete Ore-Bins, designed by J. J. Burke & Co., and erected by company.

* * *

The organization of the Silver King Coalition Mines Company, responsible for this undertaking, consists of Mine Manager M. J. Dailey, General Superintendent Forrest Mathez, Mill Foreman J. A. Tallon, together with M. G. Heitzman, engineer of erection, and H. K. Webb, designing engineer, recently added to the staff.

W. Mont Ferry, vice-president and managing director, and F. J. Westcott, secretary, naturally have been in close touch with all of these operations.

WHAT THE COAL PRODUCER MUST GET TO AVERT ECONOMIC LOSS IN BUSINESS

By Thomas T. Brewster*

The proposition that essential industry is charged with public interest is acceptable if accompanied with the correlative proposition that capital is entitled to preservation and a fair return for its use, because it is obvious that, if the natural-resources industries are not maintained in a healthy and self-perpetuating condition, the commonwealth is impaired.

A recent bulletin of the Census Department states the capital invested in the bituminous coal industry to be \$1,044,500,000, and, assuming this to be a correct basic premise, pro rated on an annual production of 500,000,000 tons, we have a capitalization of \$3.81 per annual ton.

Adhering to the proposition that capital is entitled to preservation and a fair return for its use, and with regard to the fact that dividends are subject to surtaxes, a current annual dividend rate of 8 per cent on capital invested in coal is as low as can be effective in keeping capital in the industry. And, as the corporate income will be subject to an income tax of 15 per cent, in order to derive a current distributable profit of 8 per cent the coal industry must have net earnings equivalent to 9.412 per cent per annum upon the capital invested, or \$179,246,845 of annual profit, which, pro rated on 500,000,000 tons, demonstrates an interest charge equivalent to 35.849c. per ton.

Assuming that one-third of the stated invested capital, or \$348,166,717, represents investment in reserve and undeveloped coal lands, and the balance, \$1,269,633,416, represents investment in coal, development and equipment of operating mines of an average life of, say, twenty years, and therefore must be replaced during that time, and without regard to the fact that the expense of development and equipment of such new mines will be much greater than that of those now exhausting, we are faced with the necessity of providing an annual replacement fund of, say, 5 per cent on the capital invested therein, or say \$63,481,670, which, pro rated on 500,000,000 tons, demonstrates 12.69c. as the necessary reserve to replace current depreciation and depletion. This, added to the above demonstrated in-

terest charge, gives 48.539c. as necessary to preserve capital and pay a fair return thereon.

To the above should be added a provision for administration and selling expenses, which may be moderately stated as an average requirement of 25c. per ton, making a total of 73.67c. per ton. This is exclusive of state and local taxation, of losses from bad debts, of any reserve for abnormal catastrophe, and contains nothing to cover indemnity for killed and injured workmen. Hence, if the basic premise be correct, it is obvious that to conduct the coal industry without great ultimate economic loss, the managers of coal properties, as trustees for the capital intrusted to them and as trustees for the public good, must collect at least \$1 per ton over and above the current expenses for labor and material.

PIOCHE CAMPS CONTINUE PRODUCTION OF PROFITABLE SMELTING ORE

An increasing tonnage of silver fluxing ore is being shipped from the Bristol, the average daily production of the mine being about sixty tons. The assay value of this ore is 40 cents gold, 15 ounces silver, 8 per cent lead, 1.3 per cent copper, 13.3 iron, 8.4 insoluble, 17 per cent lime, and 3.7 manganese. A car of copper ore shipped recently assayed 12.5 ounces of silver per ton and 19.8 per cent copper.

The ore reserves of the Bristol mine are being added to daily, a large tonnage having been recently opened up between the ninth and seventh levels, and eight stopes are now open and ready for mine operations.

The Black Metals at Jack Rabbit also continues to make a good showing. The great stope lately opened up on the 325-foot level continues to produce ore of an excellent grade. Settlement sheets received from the smelters show that late shipments from this property have netted about \$4 over and above the cost of mining, transportation and smelting. This ore, even when assaying less than 12 ounces of silver per ton, may be profitably handled on account of its unusual fluxing quality. The silica is often as low as one per cent while the iron, lime and manganese is usually more than 50 per cent. A recent shipment received a bonus of \$1.15 per ton over the value of the gold and silver contained.

DITCH BLASTING TEST WITH NON-FREEZING DYNAMITE

Wilmington, Del., Dec. 6, 1921.—A ditch blasting test in snow and ice of the new non-freezing straight dynamite manufactured by the Du Pont Company was made during the last few days of November, near Wausaukee, Wisconsin. The ditch was blasted by the propagated method and the dynamite was loaded through 8 inches of snow and about one-half inch of ice in wet soil, the temperature of which was 35 degrees Fahrenheit at the point of the load. Moreover the dynamite used had been exposed in storage to freezing temperatures for several weeks. The results were absolutely perfect in every respect.

The test is regarded as of great importance to farmers and other users of dynamite for open work during the winter months. Straight dynamite has for years been the standard of the world in nearly every kind of open work, but a disadvantage has been its liability to freeze at temperatures below fifty degrees Fahrenheit. Any dynamite loses some part, if not all, of its efficiency when chilled or frozen and many attempts have been made to make the explosive low-freezing. The test reported of the ditch blasting in snow and ice in Wisconsin shows that thawing with its loss of time and attendant danger has practically been eliminated.

*President and general manager, Mt. Olive & Staunton Coal Co., St. Louis, Mo., in Coal Age, Nov. 24.

OIL PROBLEMS OF THE UINTA BASIN (II)

By Prof. Earl Douglass*

In the introduction some of the reasons for writing this series of articles were given. I now wish to define the manner in which I propose to deal with the matter under consideration and to outline the plan which I wish to follow.

Though it is the duty of the geologist to keep his feet pretty firmly on the ground, yet his spirit, like those of some of the fabled heroes of old, should descend into the lower world of darkness and the shadows of death to consult the hoary records of the past and to have communion with the ghost of all the things that were, to reconstruct the histories of the ages that are gone, for the benefit of the new intelligence which is now awakening and claiming all things as its legitimate province.

In the eyes of some, he, no doubt—like the witches in Macbeth—is supposed to conjure with:

Scale of reptile, tooth of shark,
Secret relics of the dark;
Toad that in the cold damp stone
Million years has been alone;
Mummied cat and skull of dog,
Skeleton of ancient frog;
Leaf of tree and charred remains;
Prints of bygone winds and rains;
Skull of Rhino turned to stone;
Devil fishes, cuttlebone;
Snail with many a spiral coil,
His soft body turned to oil;
Oysters piled in beds pell-mell,
Many a tempting blue-point shell,
But the oyster gone to—where
Those distilled snail juices are;
Fly and gnat that filled with fear
The great horned Uintathere;
Sands that with the rivers flow
To the lakes and oceans go;
Sulphurous sludge of quiet seas,
All untouched by light or breeze;
Stinking mud of ancient lake;
Blackened ooze of reedy brake.
Now about the retort go,
In the seething caldron throw
Slate and shale from muddy slime
Changed by magic feats of time.
"Double, double, toil and trouble,
Fire burn and caldron bubble."
"Now about the caldron sing,
Oil and shale men in a ring;
Pitch comes out like dragon's blood
And the charm is firm and good.

Now now by his marvelous love and twitching of the thumb this learned magician is able to tell where you must go to find what you wish.

It is not just this way that it is proposed to proceed. It is better to go with thinking, intelligent people with open eyes through the marvelous ways of truth, than, for selfish reasons, to lead the unthinking multitude through a fantastic comedy of jugglery to the land of nowhere.

Apply Geological Methods in Problem Solution

The real puzzle which we wish to solve is not one of the great enigmas, like those of the nature of electricity, life, or energy, the quest of which, while it enlarges the borders of the known, makes the contact with the vast hazy unknown beyond seem ever larger; but we wish to consider an economic geological problem which is capable of a definite solution. We wish to begin right, proceed carefully and with all the doors of our intellect open and its wheels and bearings well oiled. We wish to see how

far geological methods will take us without expensive mechanical devices for demonstration.

The exploitation of petroleum began in an unscientific, hap-hazard way; but gradually geological methods have become of recognized value, especially in proven fields. But, in the light of rapidly accumulating data, can we rely on them—or will they prove of value—in a new unfamiliar and untested field? It would seem that in a region where the structure is evident and nearly every horizon is extensively exposed in some portion of the area it ought to be given a fair trial. If it is of no value here there may be some excuse for going back to primitive methods.

I wish to have it understood that I do not claim to be the beginner of this work, that I do not expect to carry to its limits all the vast amount of investigating and mapping that is to be done, or that I wish to give the air of plausibility to some new theory, or hobby.

Following Up Work of Others

Some splendid work has been done, especially by Eldridge, Winchester, the vertebrate paleontologists who have collected for the museums, and the men who have studied the "oil shales." But it needs more work of a general nature. We need to get more data to "connect up" that which has been done in different lines and to show its significance in relation to the problem of oil.

I have eagerly searched for facts as they exist in the field but I have just as eagerly read results of other men's work and study and have been guided by their experience and conclusions in the interpretation of facts. Time after time I have rejoiced in some discovery, which I thought was my own, and which has brought me nearer to the solution of some difficult problem; but later I have found that some other geologist had confirmed my discoveries before I had made them. This, though it took away some of my conceit, was the best possible evidence that I was on the right track.

It was when I first read Cunningham Craig's "Oil Finding" that I awoke to the fact that the prospects for oil here were unusually inviting. The continual study of this book and other works on the subject in connection with the conditions themselves has brought me to where I now am. I once said to a gentleman, "If there does not prove to be oil here I will burn Cunningham Craig's book." He quickly replied; "If they don't find oil here, they will burn you." I smiled for I knew that the territory was so extensive and the work to be done so great that I would have time to get away before they could prove that there is not an oil field here. It is, however, the principle enunciated by this gentleman of wide experience and sound judgment that I have followed, and as they will form the ground plan of the present articles, I will quote them here.

"It has become increasingly evident, not only to the scientific, but also to the commercial world, that it is to the geologist rather than to the engineer that one must look in the first instance if successful results are to be achieved." (p. 9.)

"Before asking himself if there is oil to be found in any district or locality, the geologist must consider why there should, or should not, be oil; how it could have reached such an environment, and whether it can be relied upon to be present, if drilled for." (p. 4.)

"It is not enough for him to know where the oil is found, he must assure himself on many points, such as the lateral and vertical distribution of the petroleum in geological series, the conditions under which the series has been deposited, the manner in which sufficient raw material to form the oil has been accumulated, and the pro-

*Geologist, Jensen, Utah, for several years engaged in exploratory work in the Uinta Basin country.

ess by which the oil has been concentrated and brought to its present position. When such questions are gone into carefully, one possibility after another is disposed of, and by a process of elimination an inevitable conclusion is finally reached." (p. 6.)

Outline of Plan to be Followed

The ground plan to be followed as nearly as possible is briefly outlined below:

A. If there are surface indications of oil, begin with these and ascertain their condition and significance.

B. If the oil is not in the rock in which it originated trace it to the strata in which it was formed—discover the original source.

C. Study these and associated strata. (1) To find under what conditions they and the oil producing material originated. (2) To ascertain what changes these have undergone. (3) To find evidences of local migration of the oil.

D. Find how the oil got from the original oil-bearing strata into the rock in which it is now found.

E. Get evidence as to the original quantity and quality of the oil.

F. Study the nature (stratigraphy) of the formations which are the sources of the oil to ascertain if conditions are favorable for lateral and vertical migration and concentration of the oil.

G. Get a general outline of the stratigraphy of the whole area involved and the outlines of its geological history—deposition, folding, fissuring, etc.—to find what influence these have had on the production movements and concentration of the oil. Here is where the work of the geological engineer is required.

H. If all the different lines of investigation point to a sufficient concentration of the oil the areas to be tested should be mapped and prospect holes located. This again is the work of the engineer.

Remember this is a plan rather than an outline and cannot be followed rigidly; for example, gilsonite, elaterite, etc., must be separately traced to their sources. In the next article we will begin the examination of surface indications.

NEW SILVER CAMP OF ROYSTON IS MAKING SPLENDID SHOWING

By Fred L. Miner.

Tonopah, Nev., Dec. 10.—Royston, the new silver camp 27 miles northeast of Tonopah, continues to turn out surprisingly rich discoveries, and development activities are making in a wider range of territory, with good results. Outside capital is coming in to add its energies to that of the local people who have thus far done all of the new work in the camp, and a splendid and probably sensational producing future is apparently now firmly established for the district.

A great majority of the prospects and leases throughout the district are producing substantial quantities of ore that will run from 100 to 500 ounces silver per ton, and many of them will easily exceed the higher value. The ore widens as depth is gained, the majority of the showings starting at a few inches from grassroots and spreading to widths measured in feet from 10 to 20 feet in depth.

Outstanding features during the last few days have been the discovery of two to three feet of ore in a raise above the tunnel on the Royston, Tabaracci & Co. lease on the Best Chance claim of the Hudson Mining Company from which a selected sample assayed 1559 ounces

silver and \$24 in gold per ton. Three feet of \$75 ore has also been opened in a winze some distance south of the raise.

Drifting has been commenced at a depth of 53 feet on the rich ore-body in the Betts lease, on one of the Hudson Company's claims, a 10-ton test shipment from which yielded \$715 per ton.

The Ben Hur Company is sinking on about 18 inches of quartz on its lease on the C. O. D. claim, assays ranging from \$40 to \$100 per ton. Hoist and compressor will soon be installed for deep development.

Los Angeles capitalists represented by Nat P. Wilson and Rapp Bros. have become heavily interested in the Super Six Company, on which ground seven leases are now in operation, with excellent showings and prospects.

M. L. Cooper of San Francisco has taken over a group of seven claims located by McGregor & Putnam west of the Hudson group, and plans to immediately begin extensive development.

Eighteen inches of ore that will run from \$200 to \$1000 per ton is now showing in the McCann lease on the Homestake claim, and numerous other excellent discoveries are under development around the district.

FAVORABLE OIL OUTLOOK AT EPHRAIM, UTAH

Increasing interest attaches to the operations of the Producers Oil Company, which is spending a lot of money in the development of the Ephraim, Sanpete county, oil field. So favorable a showing has recently been made that one report has followed another to the effect that a well had been brought in by the Producers company. While these reports have lacked official confirmation, as far as "bringing in" a well is concerned, the fact is not denied that a most favorable showing exists and the management is confidently expectant of securing production early in the coming year.

Just a few days ago an official of the Producers Oil Company explained the situation to the Mining Review as follows:

"Producers well No. 1 now being drilled two and one half miles northeast of Ephraim was down 864 feet on December 3rd. Oil showings and gas have been encountered at 365 feet, 442 feet and 496 feet. The oil was very heavy and in a hard brown sandstone. At 719 feet there was three feet of oil sand with a much heavier showing, and it is hoped to strike a sand between 900 and 1000 feet which should give good production. A second water strata was encountered at 814 feet, giving an artesian flow of about 35 gallons per minute. This water is being shut off between 850 and 900 feet.

"The Producers Oil Company will start well No. 2 one-half mile east of Ephraim soon after the first of January, and a contract has been entered into with a California oil corporation for the making of a deep test. This contract calls for 3500 feet in case oil is not found in commercial quantities before that depth is reached. A second contract has been made for a test of 1500 feet, starting in April.

"The drilling so far has proven part of the Sanpete valley to have an oil structure and production is looked for early next year."

The Northwest Mining Association will hold its next annual convention at Spokane from the 14th to the 18th of February, inclusive; "and," writes Secretary F. C. Bailey, "as we believe this coming year will be a great year for mining, we are going to try and have a big convention." Last year's gathering of mining men and engineers was a most successful affair in every sense—socially, educationally, professionally—and much goodfellowship was engendered. The coming convention ought to be a hummer.

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*Illustrated.

WORTH-WHILE ARTICLES IN THIS ISSUE

The first article in this impression is a detailed description of the Silver King Coalition Mines Company's new 450-ton milling plant at Park City. It carries a comprehensive flow-sheet and good illustrations of the mammoth ore bins, the skeleton work of the main buildings and a picture showing what the plant looks like under cover, less than ten months after the old plant was completely wiped out by fire. This is the first time the plant has been described in print and mining and millmen everywhere will be interested in knowing what has been accomplished in so short a time. It is expected the plant will be in commission not later than the anniversary day of the disastrous fire, or by February 28th next.

Another article that is timely and to the point, is that entitled "The Prospector, the Mining Engineer and the Proposed New Mining Act," by S. F. Hunt, the well known mining geologist, miner and writer. The feature of this article is its originality in the discussion of a subject that has called forth much comment since the introduction, last summer, of the proposed new mining law bill in congress. Mr. Hunt is the first writer, to our knowledge, who has expressed disapproval of the bill as presented to congress and who, at the same time, has offered and outlined a basic foundation for a substitute measure that he believes would place the mining industry in a recognizable class of its own, free from

all technical inequities and ambiguities. Whether you agree with his plan or not, you will agree that he has presented some original ideas and that, fundamentally, at least, there is reason in them. Read the article and then, if so disposed, discuss or criticize it in the columns of the Mining Review which are open to you.

Letson Balliet, consulting engineer, of San Francisco, who served as efficiency engineer for the Moore Shipbuilding Company during the war, and who has contributed many articles to the technical press on industrial economics and political economy, has an article on the future of mining, as it affects the money situation. Every sentence in his article is "loaded." Possibly you will not agree with what he says. Whether you do or not, you will admit that the author does not "beat about the bush" in expressing himself.

Also in this issue is the second article of a series that is being written for the Mining Review on "Oil Problems of the Uinta Basin," by Prof. Earl Douglass. You will find these articles intensely interesting and educational as Professor Douglass dives continually deeper into his subject. The first article gave his reasons for tackling the subject. The current article outlines the basic foundation for the treatment of the subject. Follow the professor through the series and you will learn something worth while concerning the oil possibilities of the Uinta Basin country.

THE MINING OUTLOOK

By Letson Balliet, E. M.*

The outlook for mining is one of intense interest. It is of interest to those who are engaged in the mining business, and to those who are remote from mining districts.

The world's crying need for money, makes it essential that money be produced. By "produced" I do not mean that words be printed on a piece of paper, which is to pass as money. That is not money. Read them. They are only a PROMISE TO PAY MONEY. None of them are anything else. There are more "promises to pay" floating around in the world and in this country, than there is money to pay.

If you have \$20 in your pocket, and have given four notes for \$5 each, payable on demand, those four notes are worth \$5 each, but if you have given eight notes for \$5 each, when you have but \$20, your paper is valueless on your ability to pay, and the only way you can make your notes worth par is to DIG UP ANOTHER \$20 and when you have done this you will have \$40 to pay the eight promises to pay.

We all realize that the country is suffering from what is called "hard times." People meet one another and inquire, "what is the remedy?" Manifestly the printing of more notes, or promises to pay, will not relieve the situation. The more that is printed the less the promises are worth. There can be but one economic remedy, and that is to DIG more money to back up the over-issued promises to pay—the so-called paper money.

It is idle folly to think that the country can finance itself by trading alone in the promises to pay. No new money is being created or produced by such a practice. It is merely trading around among ourselves, with the old paper. It's like trading jack-knives—nobody profits much by the trade.

Some folks say much about idle labor, idle factories and stagnated business, but to seek the remedy among these factors is merely hacking at the branches of the evil, which cannot effect a permanent relief. You cannot

*308 First Savings Bank Bldg., Oakland, California.

not stop the wind blowing by chopping down the trees that bend their branches in the storm. Idle labor, idle factories, and stagnated business are EFFECTS, not the cause.

Manufacturers will not and cannot manufacture products that they cannot sell. Hiring labor to make factory products with the expectation that labor will buy all the production, is as intangible as another perpetual motion idea. Its own friction, or weight, overcomes any energy used to start it. It simply will not run.

Nobody but the inventors of such ideas are ever deceived, and they become disillusioned in time. Any manufactured stock, without a market, and in the end be-tion of commodities that are not in demand would quickly use up all his capital and have his warehouse full of manufactured stock, without a market, and in the end be obliged to lay off all his labor when his capital was used up in payroll.

We have seen criticism and comment upon the fact that thousands of great ships are swinging idly at anchor, and that every railroad yard is a parking station for idle freight cars, and that factories do not run, to produce freight for these ships and cars.

The real reason for all this idleness is the over-issue of promises to pay, in all countries, the United States included. For example, in this country Russia cannot buy because there isn't a manufacturer nor merchant that would accept Russian kopecs at anywhere near par—because Russia has issued billions of dollars in promises to pay without any money to meet the promises. Russia has taxable property but no money to pay the taxes. Russian buyers cannot afford to pay dollars and get but a penny's worth. They cannot afford to pay the discount in the rates of exchange. German marks are the same; millions of dollars worth issued without any money to meet the paper circulation, hence they are worth less than a cent a mark. All foreign paper is at a very low market value. For this reason foreign buyers cannot afford to buy in the United States and if they don't buy our products, we have no occasion to make them, and no need of buying the raw materials either at home or in foreign countries. Hence there is no freight for the ships, and no freight for the railroad cars that are parked on side tracks.

Work will not afford permanent relief. It will merely relieve temporarily till the supply of manufactured goods is so great that no manufacturer can stand to carry the stock. Then will come failures and worse panics. Even those who think to save will soon use up their hoarded savings. The paper money will gradually be drawn into fewer and fewer hands. Only the banks can accumulate this paper wealth, in their discounts and rates of exchange. It's like a giant poker game, with the banks acting as the "kitty." If there is no NEW MONEY brought into the game, it will all be in the "kitty" in time. Then what will we do? We'll get up from the game and go out and DIG for a new stake.

Therefore, the answer can be only one thing—we must dig up new money. We must mine out more gold and silver, and put it in circulation to back up our over-issued kopecs, marks, francs, pounds and Federal Reserve promises to pay.

The people of America will not sit down and starve, the manufacturer will not be content to watch his machinery rust in idleness, nor will the merchant be content to see the spider spin cobwebs across his doorway. Industry and trade cannot prosper without the continual production of money. Business of all kinds "runs down" when the production of money stops. While the production of money

did not wholly stop, it was heavily decreased by taxation upon EFFORT, and an over-issue of promises to pay were issued to tide over an emergency; but the day is fast approaching when the demand will come to PAY, PAY, PAY.

Our mines must furnish the money, or we will merely renew our notes and promises to pay, and be no better off—with expenses, exchange and discounts eating up the whole, while the "kitty" gets it.

There is nothing like being hard up to make a man dig, and now that the nation and the world are hard up with promises to pay that they cannot meet, you can expect them to START DIGGING very soon. History has shown that a period of mining activity always follows a period of hard times. The reason is apparent. When men are making all the money they want at home, when their business is prosperous and they are busy, but they have no time to divert their attention to remote industries like mining; but when there is little doing at home, and their business is poor they will listen to the call of the mines as a means to build up and support their failing fortunes.

You who are in the mining camps, and districts, are far better located than those in the industrial districts. Don't be deceived into thinking that distant pastures are greener, for they are not.

It's the mines that will pay the war debt, and bring the country back to normal just as the Comstock did during the reconstruction days following the Civil war. Trading jack-knives (paper money promises to pay) will never pay the debt. Those paper money notes, can be traded around from now till doomsday, and they will still be paper money notes, if they are not paid with money.

The Mining Review has decided to issue an "Annual Review" number on January 15th. Prospective advertisers and special contribution writers are respectfully requested to make their applications for space and submit their manuscripts at the earliest possible moment—all by the end of the present month.

"Buy something made of copper" for Christmas. It will help to boost the copper industry and make times better for you.

PRINC CON. ANNOUNCES FINANCE PLAN

The board of directors of the Prince Consolidated Mining and Smelting Company has succeeded in working out a plan for the sale of \$100,000 of bonds of the corporation's issue of \$300,000, according to General Manager M. C. Godbe. In the first place, the bond issue will be secured, according to Mr. Godbe, by a first mortgage on the property, which, he said recently, with its ten miles of railroad, shops and surface equipment, has a value of several hundred thousand dollars.

The purchase of a \$100 bond bearing 7 per cent interest will carry with it a bonus of 100 shares of stock, Mr. Godbe said. By a special provision, the bonds can be converted into stock at par. In addition, an option to purchase at par 100 shares of additional stock for every \$100 in bonds is allowed during the life of the bond. Moreover, says Mr. Godbe, no bonds will be sold and all money will be returned unless the complete issue of \$100,000 is subscribed for.

Speaking of advertising—a man who advertised for a wife, said afterwards: "I can't say that advertising pays; but it certainly does bring results."

The Prospector, The Mining Engineer And the Proposed New Mining Act

By S. F. Hunt*

The passing of the prospector, the licensing of mining engineers, and the Bureau of Mines' proposed new mining act, have been discussed pro and con with warm interest of late in most of the mining publications. For clarity of presentation and regard to details, there are three subjects that have been treated separately. Yet, in truth, they are closely interlocking questions in which the failure of one is the affair of all. It is plain that these three factors involved in the production of the useful metals should co-operate and balance to be effective and of service to the state.

The prospector has been compelled to abandon his chosen work for lack of support. The engineer sees his number increasing and the number of mines decreasing, thereby dividing his chances of success. And all those interested in metal mining have realized for some years that the discordant jumble of mining laws now in force are antiquated and should be replaced by more intelligent and equitable legislation. The Bureau of Mines, therefore, deserves due credit for finally getting a bill introduced in the 67th congress and up before the miners for discussion.

As matters stand the prospector has ceased to be a recognized factor in mining. In the form and manner in which it has been advocated the engineer's demand for a license has been voted down by the members of his profession; and the new mining bill has met with more criticism than support.

This state of affairs suggests a mess and a mix-up that cannot be harmonized or handled along conventional lines; and it will not be attempted. To begin with, precedent will be thrown to the winds; and only fundamental principles of right and wrong conceptions will be accepted as tenets and guides, lead where they may. So, to analyze and set forth, tentatively, a unified plan of cure in each case is the scope and purpose of this discussion.

The Prospector

Search for the precious metals has ever appealed to the strong and intrepid. There is a zest and fascination that belongs to prospecting and mining the precious metals that attaches to no other occupation. The prospector was, until of late, a picturesque and admired pioneer among us. His adventurous spirit and sturdy energy has played its part in the rapid growth and winning of the West. Why at this time his decimated numbers should become objects of disdain and neglect is not plain on the grounds of usefulness and past performance. Why should these brave, unsophisticated volunteers, doing sentry duty on the outposts of society, be shunned by all except the bucolic nomad of the desert who swings his arm and shouts "go way 'round 'em, shep."

There are causes, most of which are extraneous and have nothing whatever to do with mining, but which are traceable to other social inequities and, mainly, to the faults and offenses of sub-normal individuals who ape every line of legitimate industry for fraudulent gain. These are the alluvial anthropoids at which all cerulean legislation is aimed, but which has missed its mark and mutilated the miner, since he is the most innocent and least able to shield his vocation from unscrupulous design, or the freak doings of unhappy osteocephs.

That the ubiquitous, frenzied and Ponzed fraternity of Wallingfords, charlatans and mountebanks have taken their

turn at fake mining—as they are now at fake banking securities and exchange schemes—is not denied; but these invasions should not remain as a fixed blackmail upon the legitimate miner, when they are not upon the banker and broker. And again, the inept, indiscriminative mining laws in force have not allowed the public to distinguish the alluvial skinner from the sub-soil miner, owing to a slight similarity in the sound of their stage names; which accounts for much of the attitude of hostility toward the miner. Any new mining legislation can and should make this distinction plain and prominent.

Here are the reasons and the way. All agricultural, grazing, forest and city lands are alluvium which is derived from the disintegration and decomposition of the sub-soil, or rocky crust of the earth—the lithosphere. All of the elements of alluvial soils that produce and sustain plant and animal life are derived from the bed-rock formation. It is a condition precedent, limiting in quantity and kind every form of life. Now, sunlight, air, water and the miner are the four active agents Nature employs to perform her services to all. Sunlight and air perform their work on the surface, where the work-a-day world of others moil and mangle for her gifts. Water and the miner descend into the dark, deep caverns of earth and return laden with iron, copper, silver and gold. Deprived of these useful metals civilization would perish. Hence a new mining act should clearly and concisely distinguish between alluvial and sub-soil rights and workers. Such an act would tend to restore to the votaries of the deep ground a standing and respectability they have lost.

The prospector has gone, but he has not been killed by kindness. His vocation carried him away from busy throngs and imposed a life of unwedded solitude upon him. His dream of love was ore—not o'er—and in that dream a fair vision of a prim school ma'm in an enchanted abode was ever beckoning him to take the wings of the wind and fly to her side. They never met or married, and he is gone—gone where no woodbine twines nor wangedoodle waits to mourn his loss—over the dump with the waste and worthless things.

Mining Engineers

A generation ago there were but three engineering schools in the United States; now there are about fifty that teach mining engineering courses. Only a quarter of a century ago the mining engineer, clad in his high boots and corduroys, was a rather spectacular figure; yet the brilliant services he performed for his employers were even more commanding than his appearance; and his intrinsic worth to the business of mining was recognized and rewarded. Seeing this, many fond parents sent their sons to engineering schools, believing they were preparing them for useful mining careers and certain positions. Then the mining field was fair, open to all and rapidly expanding. No one could foresee a general decline of public interest and support, and the slow gravitation of mining operations into the hands of a comparatively few concerns, nor the exhaustion of many ore deposits at comparatively shallow depth.

As a result of present conditions, and other untoward circumstances included, less than fifty per cent of their number now find employment in their chosen profession; but they have found themselves well equipped to engage in

*Mining Geologist, Salt Lake City.

other more remunerative lines of work. Nevertheless this hiatus amounts to a disappointment to not a few of them, who would prefer to engage in mining.

Scanning the situation broadly, some have noted and objected that almost any alluvial mountebank, capable of putting on a front, could pose as an engineer before the public and succeed with the imposition. Also that there remained in the employ of mining companies many technically untrained men in responsible positions that they could fill. Just what should be done was a question. They realized and admitted it would not be ethical to displace the thorough, practical miner who had arose from the bottom—he being the connecting link, the interpreter, that translates theory into practice—and in this capacity, as useful as the technical engineer; and that his dismissal would tend to create a caved stope between the top and bottom levels of mining endeavor. So, consciously or sub-consciously, not a few have advocated the licensing of engineers as a corrective measure to protect their particular qualifications from counterfeit and abuse. So far all plans proposed have met with weighty opposition and have been voted down, while the invocations of the disappointed have ascended to the throne of Pete for guidance in this unsolved dilemma.

Economic Fitness of Things

Every calling and profession has its limitations. Some are inherent and others imposed by terms of employment or habits of thought and action. Engineers have been better in mathematics than economics, and not many have gone beyond the serious yet silly jangle over vertical lines and extralateral rights, to question the basic principles underlying the validity of any law, mining or otherwise. Too much figuring and not enough thinking may be the trouble—yet, figures are good in their place. The reason that figures cannot lie is because they cannot talk; and the same reason prevents them from telling the truth. They are dead, inanimate things. Those who depend on being capable of figuring the angles of right and wrong are disconsolate in that they always fail. To succeed they must consult the sub-conscious Monitor for reasons and formula superior to the trigonometric functions.

A globe of cast-iron or lead is an orbicular mass of iron or lead throughout. The peel of an orange or the shell of a coconut are the outer spheres enclosing the meats within, which are composed of various properties. The earth is composed of a number of elements combined and arranged in shells or spheres three of which limit and control existence, and with which we have to deal in mining as in other vocations. These are the atmosphere, the hydrosphere and the lithosphere. We discern land to be the controlling sphere, since water drains to the sea and the air is displaced and floats above; and that the range and distribution of life everywhere is dependent upon land. There is Order and Method everywhere. The fishes swim down in the seas and the birds fly above in the air; land animals move about between both in their appointed elements.

Thus, in the same manner, organized society diversifies its workers into numerous callings, trades and professions which are reduceable into four grand divisions. These are, from top to bottom: aeronauts, birdmen; alluvials, farmers; nauticals, seamen; sub-soil or lithics, delvers and miners. Now, there are aviation laws for birdmen; navigation laws for sailors; a hopeless jumble of laws for alluvial landmen, and no distinctive laws for the sub-soil delvers—nothing to segregate or distinguish them from the windy, watery, dusty world of others. Therefore the sub-soil workers have a grievance and a right to demand

the passage of mining laws which will distinguish them, and their realm of work, from all the others.

The policy and plan of separating sub-soil from surface rights is not new. It was adopted in Spain 300 years ago; in France and Italy 100 years ago; in all of the Spanish-American republics from their beginnings, and in Australia. The old English common law classed all mines as "Crown lands," from which our term "royalty," instead of "mine rent" is derived. Mining lands are not "patented" or deeded in other countries—they are granted. In his "Mines of the World" J. H. Curle, an eminent English authority, estimates the average life of mines to be eleven years—as statisticians estimate the life of a generation at 35 years.

Now, alluvial land is restored from year to year, and can be cropped for generations, as has the Nile valley. Mining is transitory; even some big mines are dug out and closed in a few years time. Why, then, compel the sub-soiler to patent, at great expense, land that must shortly become valueless for his use, and which may interfere and conflict with a surface-soil right? The sub-soiler needs no patent, but requires a Federal Mining Grant covering the life of his mine, or say, for a generation or two. In any event, when his mine is dug out it has no value, and can not be sold, and he must go in search of another.

However, at no time should the delver become an alluvial (dusty) land speculator. It is no part of underground work. Leave this pastime to the riff-raff and the "top-men," to whom it belongs. The surface ground the miner displaces should be limited by the size of his sub-soil mine and plans of work, and not other considerations, in order to make his realm of action distinctive and all his own. Otherwise he "comes up for air" and loses his identity. Because our law-makers are 100 to 300 years behind the rest of the world in the matter of mining legislation need not discourage delvers anywhere from attempting to wheedle and coax them on. The United States sadly needs an up-to-date mining act.

Licenses—Permits

The mining engineer is the technically educated miner; the mining geologist is the technically educated prospector. This duo of delvers supply the brain and brawn and represent the four rocked-in corners and the four equal sides of the square claim of the sub-soil workers. Now these facts not only entitle them equally to licenses, according to rank, but should make it obligatory on each to hold one, to distinguish his position; and to secure each in his rights and privileges. There should be a Federal License at \$5 per year to each; but every mining partnership, association or company, should pay \$10; underground foremen and contractors, \$5. This completes the list of eligibles. So one \$10 and one \$5 license could cover any single mine, even though 5,000 men were employed. This plan excludes the aviators, navigators and alluvials, and returns the business of mining to the delvers.

The license should be designated as "United States Eminent Domain Sub-soil Mining License and Permit." It can and should be in blanket form, serially numbered and graded about as follows: 1st, Prospector; 2nd, Miner; 3rd, Mining Engineer; 4th, Mining Geologist; 5th, Partnerships, Associations and Companies—and should be issued by all Federal Land Offices to applicants with proper credentials. The license should impose obligations of rectitude, good conduct, fair dealing and faithful service upon all alike, with penalties of fine or forfeiture, or both, according to nature and seriousness of provision violations.

Those excluded from eligibility should be: Bankers, brokers, all stock-selling concerns and agencies (except

possibly mining exchanges) and all manufacturing, mercantile and surface enterprises of every sort. Then, no citizen should be permitted to locate or hold mining land without a license—license-holders alone being permitted to locate and operate sub-soil properties; and no miner, engineer or geologist should be allowed to survey, sample, examine or report on metal mines and prospects without a license. But any reputable citizen, male or female, who desired to engage in mining could do so by securing a prospector's license and begin at the beginning.

I would specially include in the list of eligibles all editors and qualified craftsmen of technical mining publications and schools; all members of the American Institute of Mining Engineers and all members of the United States Geological Survey, who should be admitted on application for licenses, or who might be presented with licenses as a mark of respect to their professions.

Distribution of funds: Every dollar collected by the U. S. Land Offices through the sale of licenses, collection of fines, etc., should be turned over to the Bureau of Mines as an "Earned Income Fund," and to be used by it—as it unquestionably would be—for the advancement of mining and the benefit of the fraternity of sub-soil workers.

Grub-Stake Regulation: For the protection and security of the public and the delvers alike, a common-sense, fair-to-all "grubstake" law or regulation should be incorporated in the act. It should set a minimum amount to be paid, equal to the annual pro-rate expense of partnership interest, exclusive of mining tools, supplies and equipment.

The New Bureau of Mines Bill

The proposed new mining act was introduced in the 67th Congress July 12th, 1921, by Congressman Arentz, and referred to the committee on mines and mining. Since its publication the bill has received more criticism than commendation. Few approve it. The criticisms have been directed mainly against details and particulars instead of principles. It would seem that if the principles of the bill were sound the particulars and details could be harmonized, since right principles dove-tail and are always capable of adoption, with benefit to legitimate interests and industry.

No one can question the sincerity of purpose and good faith of the authors of the bill. They are all high-class, honorable gentlemen of great ability and wide engineering experience. It was a serious undertaking and hard task at best to attempt to unravel and dispose of the present mixed and muddled mining laws. They are to be commended for making a start and bringing the question out in the open for discussion. Probably not one of their number is wholly satisfied with the committee's work, so have promulgated the bill as a compromise—the best they could make under the circumstances. The wording of the bill shows painstaking care and ingenuity. Nevertheless the bill is faulty in principle and detail, and should not become law.

The bill expresses no philosophy, involves no fixed fundamental principles nor makes any distinction between surface and sub-soil rights. The lithosphere was and is a condition precedent to any and all surface features of life; and that is the rock upon which the principle and right of Eminent Domain rests beside the plainer human fact that the right of the public always transcends the right of the individual. Now, veins and deposits of ore are parts of the bed-rock complex, trend and dip in all directions and belong to the condition precedent which modifies and controls drainage and all other surface features. Hence the sub-soil phenomena can not be affected by arbitrary cardinal lines.

On perusal the bill shows evidence of collaboration. About half of it was reasoned out, and is good; the other

half was figured out, and is bad. The first is human, sentient and right, where the remainder is cold, inarticulate and indifferent. There is no occasion to discuss it in detail; its good features are faint and the bad points fatal, which, in its entirety, consigns it to the limbo of the scrap-heap.

Constructiveness—Bed-Rock Principles

Criticism is inane when no substitute plan is offered. It is easier to find fault than to follow truth, or abandon obsolete, outgrown laws and notions of economics. A mining law promulgating exact principles of right and justice would meet with opposition by those it would benefit most; nor is it possible that any one person could frame such a law alone. Yet each may give his mite toward the day when the whole can be assembled.

First of all the law should vouchsafe and extend the right of Eminent Domain over all sub-soil minerals; clearly and concisely segregate and define the difference between sub-soil and surface values and rights; limit and define the right of discovery; establish the source of value and worth; assert the authority to regulate and rule; and admit and enforce the reign of the principles of justice and equity within its powers to convey. These conditions may be illustrated by an example, as follows:

Columbus discovered America; the prospector does not discover the surface land; he discovers, or unearths a vein or deposit of ore on land discovered by Columbus. The surface right may, at the date of his discovery, belong to a farmer; but the sub-soil ore does not, since the farmer did not discover it. If the farmer, possessing only an agricultural surface right, discovered the ore, it could become his only by location under the provisions of the mining law—because he has unearthed a property and value which does not attach, nor belong to his surface right. This proposition limits and defines the right of discovery.

If, like Crusoe on the island, the prospector was alone in the world and "monarch of all he surveyed," the pure gold he found would be as worthless to him as were the "charms of solitude" to Crusoe. The value of his ore is created by the demands of industrial use, and not in any sense by the prospector. He discovers neither the surface land nor the value of his ore. He simply finds an ore on which the world of others and industry have set a price. This proposition establishes the nature and source of value and worth.

Therefore the state, representing the world of others, may not, properly, dismiss by patent, nor surrender its right of Eminent Domain in perpetuity, since the common property of value and worth would pass with a single right. Yet the state must police and secure the prospector in his right of use and private possession; and in performing these functions it must determine by grant his right in area, depth and time; for he and the world of others are its citizens.

This proposition provides the basis and constitution of authority to be for the protection and conservation of common and individual rights.

So, to continue, the honor remains, but Columbus' right of discovery has expired; and the land he discovered belongs now to the world of others—the United States of America. Hence it follows the right of discovery is limited and not perpetual. *Quod erat demonstrandum.*

Features Needed in Equitable Mining Law

Brushing aside as we have the cobwebs of prejudice and the confusions of thought that have so long obscured a clear vision of what constitutes a discovery, a right, and their limitations, the work of framing an equitable mining law is largely one of detail. So only a general plan, modernizing regulations, will need explanation here.

The first thing to do is to segregate surface from sub-

soil right. This is simply and easily done. Surface right is worth no more to the miner than it is to the homesteader—\$1.25 per acre, which is the already fixed Eminent Domain charge of the government, and which the claim holder must pay in annual installments of 25c. per acre, or \$10 surface tax per year on each 40-acre claim held. So that at the end of five years (the discovery period) he has paid out \$125 per acre, the government's price, for his displacement of a surface area. At the end of five years, at his option, he is entitled to a Federal grant or an extension of three to seven years more time, on new sub-soil and surface right terms. Now, instead of ploughing or fencing the tract, the miner digs holes for 20 eight-hour days per year on each 40-acre claim. This is a sub-soil obligation, looking to the development of a mine, and when no mine is found there is no further sub-soil obligation, the annual work and the surface tax amounting to \$110 per year on each full claim of 40 acres.

No sub-soil worth attaches until pay ore is exposed; and no taxes are due until the ore is marketed, when it must pay 3 per cent royalty on mill, mint or smelter returns, as marketed. In the event of war or other national calamity, without legislation or notice, the government may increase—up to double—both surface and sub-soil rates; and under the same fiat, assume control and operate any or all mines for the security of the state. But 10 per cent of the full amount of royalty (not rent) paid in must be returned to the miner at the end of each quarter year. Because this amount is the Mosaic tithe, the soul balm, the charity fund, which belongs to the worker and not to the state.

The cash amount paid annually for surface displacement is known as "ground rent." The 3 per cent on production is known as "royalty." Rent is surface and royalty is sub-soil right of Eminent Domain, segregated. These charges set aside all local property taxation, leaving only road and poll taxes to local government; the state dividing its revenues with the local government instead.

This simple, direct, self-collecting, indisputably just plan of taxation, abolishes the bullion tax, the property tax, the excess profits tax, and all of these wretched, multiplied abominations, which have badgered the lives and ruined the souls of little and big mining concerns alike, and their attorneys. It gives all delvers one more chance to be honest, happy and prosperous.

Extralateral Rights

But to proceed: Since it has been demonstrated, and is self-evident without solution, that surface right does and must follow a plane or horizontal line, sub-soil right can not conflict, but must follow a line at right angles to the surface, or a vertical line. So, sub-soil right has only vertical range. It is the right angle "side opposite" to surface right; so there can be no "side adjacent" angle between, or "extralateral" angle, to either horizontal or vertical rights. They exclude each other. Hence, there is no such thing in nature as an "extralateral right." It is a fiction; and the square claim with vertical lines of right is proved without question.

Details

Let the United States make a beginning by adopting the metric system of land measurement to mining claims, giving the hectare a value of $2\frac{1}{2}$ acres instead of its value of 2,471 acres, as in France and other countries. Then 4×4 , or 16 hectares, would equal a 40-acre lot 1,320 feet square, and constitute a full claim. One hectare then will be 330 feet square, and should be the unit of location instead of the 10-acre lot, as proposed in the new bill.

As the homesteader is limited to 160 acres, on which he

must live and make annual improvement for five years, limit the prospector to four full claims, or 160 acres, also—he can not do the work on more—and all partnerships and associations to 320 acres, by location, not including mill and reduction sites. Give the prospector the privilege, at his option, of relinquishing one or two claims, if he has four on record, so that he can locate other ground. He seldom, if ever, has four good claims at one time, and is fortunate to have one good claim in four. The relinquished claim rights would compose his "flying squadron" with which he can chase booms. This will discourage land-hogging and encourage carefulness in selection of locations, which will rebound to his credit and restore public confidence in his work and occupation. It will make a prospector and miner of him instead of a "desert rat" and "wild-catter." Five years from the date of his first license, if he can show that his "whole squadron" has been sunk in real battle for a mine, provision should be made whereby he can pre-empt or renew his location rights—and all will be well with the delver and the world of others.

Trade Notes

Last week the Sullivan Machinery Co. reported the sale of two drilling machines to Pioche operators by telephone. Is business picking up? Yep.

Early in the month, according to report, the Denver Rock Drill Co., the Allis-Chalmers Co. and the Sullivan Machinery Co. participated in filling a big order for rock drilling machinery with the new management of the Grand Central mine, at Tintic.

The Allis-Chalmers Manufacturing Co. has just issued a 60-page, highly illustrated and handsomely printed bulletin (No. 1119) on Steam Turbine and Alternator Units, covering high pressure condensing units of 1500 and 1800 revolutions per minute. These handsome and powerful machines are designed particularly to meet the extensive requirements of public utilities, municipal railways, lighting and industrial activities—in fact for any power installations where perfection of operation and great capacity are determining factors. You can learn everything about them by consulting this newly issued bulletin. The Salt Lake offices can supply you with a copy.

Construction Notes

During eighteen days in November building permits at Nampa, Idaho, totaled \$44,085.

The new high school building at American Falls, Idaho, is now nearing completion, and will soon be ready for the furnishings.

The Betty O'Neal mines, located at Battle Mountain, Nev., N. H. Getchell, Gen. Manager, recently closed a contract for the metallurgical work and designing of a 150-ton concentrating mill for that property with the A. H. Jones Company, Dooly Building, Salt Lake. It is planned that active construction work will begin in the early spring. The ores to be treated are silver-gold and it is stated that a large tonnage is developed ready for extraction and treatment.

General Manager W. J. Tobin of the Mayflower at Pioche, Nev., says the ore body recently opened in the Starlight group is now showing for seventy feet, and across two feet will carry more than \$47 in gold values. The mill, which started with ten stamps three weeks ago has proved a success. An extraction of nearly 96 per cent has been obtained. Now that the vein in the Starlight has been proven, another five stamps will be added within a short time.

Around the State

A new 300 horse power motor has been delivered at the Eagle & Blue Bell mine. It will not be used for the present but will be kept for any emergency that may arise.

The St. Clair lease on the Buffalo mine on Lion Hill in the Ophir district, recently shipped a 55-ton carload of ore which netted \$32.50 per ton. Control assays showed 38% lead, 47 oz. silver and \$2 in gold.

The Montana-Bingham mine is shipping more than 100 tons of ore daily to the Garfield smelter and employs at present seventy men. The fluxing qualities of this ore makes it possible for the mine to ship quantities of low-grade mineral.

The Garrison Mining Company, capitalized for \$10,000, has filed articles of incorporation with Clarence Cowan, county clerk. The incorporators are J. P. Gardner, president; S. B. Tuttle, vice president; S. W. Morrison, secretary-treasurer; John Mortimer, Thomas O'Connor and M. R. Evans.

Keep your optimism at high-pitch regarding the future of the New Quincy, says the Park Record. This week wonderful specimens of exceedingly high-grade ore was brought down from the property. It was perhaps from a "little pocket," but nevertheless indicates that rich ore is there and will sooner or later be uncovered in quantity.

The development of the North Beck property continues without interruption and while underground conditions remain unchanged the showing is quite promising on the 1600 level, says the Eureka Reporter. Two drifts are being driven on this level, one to the east and the other to the west, and it is quite certain that something of importance will soon be encountered by one of these headings.

Manager James B. Allen, of the Glenallen, was a passenger for Salt Lake yesterday afternoon, after brief visit to the property of which he is in charge, says the Park Record. It is understood that Mr. Allen is about to be rewarded for his strenuous efforts of late by securing sufficient capital to liquidate all indebtedness against this promising property and to again start development work on a larger scale than ever.

From the "old faithful" Ontario comes the cheering news that four feet of good shipping ore was uncovered the past week on the 1300 level, says the Park Record. The "find" was made, it is learned, in an abandoned drift that was not thought worthwhile to prospect by some, but which Foreman Frank Fleishman was a bit enthused over, and under his direction a drift was run, with the above results. A big and permanent body is expected to develop.

Officials of the Chief Con. expect water in the Water Lily shaft at about 1550 feet, but of course there is nothing certain about this and the water may be at much greater depth. The shaft now has a depth of something over 1300 feet and another month's work should be sufficient to take it to the 1550 level. During the past few days there has been a decided change in the formation through which the machine drills are cutting. The waste material now being hoisted contains iron stains and other signs of mineralization. —Eureka Reporter.

The stockholders of the Pittsburg Consolidated Mining & Milling Co. held a meeting in Salt Lake on the 5th for the purpose of ratifying the deal by which the Pittsburg Silver Mining Co., a Delaware corporation, secures a bond and lease on the former company's properties in the Little Cottonwood and American Fork mining districts, on a purchase basis of

\$150,000. The purchasing company has been in possession of the properties since last September. An aerial tramway now is under construction for the handling of the mine's product to the loading station in American Fork canyon.

In Nearby States

ARIZONA

It is reported that M. B. Dudley, who recently announced his resignation as general manager of the Mohave Mines Development Co., Inc., the Daisell M. & M. Co., the Cherum Peak Silver, Inc., the Mineral Park Mines, Inc., the Golden Star Mines, Inc., and the C. O. D. Mines, Inc., will undertake the development of several Katherine district properties for eastern interests.

One reverberatory furnace at the International smelter at Miami has been blown in and the operation of the smelter is now well under way. A considerable number of repairs and some new construction work has been completed and everything is in shape for an indefinite run at one-third capacity. Some 250 men have been put on since the renewal of operation, with the result that the Miami district is more active than at any time during the past seven months.

W. T. Little, president of the Kaaba Mining company, operating vanadium mines about 30 miles east of Kingman, was in Kingman a few days ago, in conference with business men, Mr. Little believes he has one of the most important vanadium mines in the country and that within a short time he will be able to start the marketing of the product. There is a mill on the property and a pumping plant at Round Valley that is capable of supplying sufficient water for the mill. This mill is capable of taking care of 70 tons daily and the mine is reputed to have 30,000 tons of ore blocked out that will average 1½ per cent vanadium protoxide.

COLORADO

The Mount Pleasant Mining Co., which is working the Smuggler-Almont at Dunton now has six men employed and will do development work during this winter.

Settlements for the first cars of concentrates from the Hidden Treasure mine, near the Camp Bird property, are said to be highly satisfactory to the management. Additional shipping will be made during the winter.

Reports reaching Silverton during the past week are that the work of clearing up a large cave in one of the levels of the North Star mine, on Solomon mountain, has been accomplished by the North Star Leasing Company, and that ores of a shipping grade are being sacked from this portion of the mine.

The company which recently took over the Salida smelter has been incorporated as the Colorado Smelting Corporation organized for the purpose of "doing a general smelting business," and capitalized with 10,000 shares of no par value. Among the directors are Louis Sanders, New York; James Grafton Rodgers, Denver; Roger P. Wolcott, Denver; Joseph George and Charles R. Enos. The progress of this concern in reopening the splendid Salida smelting plant is being watched

with interest by operators and owners of property, in Bonanza and Lake City.—Mineral Age.

IDAHO

According to reports at hand, high grade gold-silver-lead ore has been opened in the lower level of the Fall Creek mine, in the Lakeview district, about 500 feet from the tunnel entrance. Directors of the company are W. E. Howard, D. A. Thomason, W. C. Ames, T. O. Ruen and G. M. Walker, all of Sandpoint.

Two cars per day of ore are being shipped from the old Empire Copper mine of the Idaho Metals Company near Mackay. The ore is being shipped over the company's three-mile aerial tramway direct to the cars on the railroad. The ore being mined by the lessees is accumulating so that there will be a reserve on hand for continuous shipment from this big copper producer of Idaho.

A. W. Fahrenwald, ore dressing engineer of the United States bureau of mines station at the University of Idaho, is back from Reno, where he helped to solve ore-flotation problems that were troubling a Nevada mine. The problem was to separate lead and zinc from ores into commercial products by different processes. Some of the methods worked out for the Coeur d'Alene ores were found applicable.

"Showings in the east drift of the Imperial Mining Company's properties in the Lalande district of the Coeur d'Alenes are most gratifying," said Homer G. Brown, secretary-treasurer. "The vein is holding out well, in fact is growing wider and is from 10 to 15 feet wide. Through it are considerable lead carbonates, with some galena. Last month three men tunneled 75 feet. If we have no bad luck they should reach the point under the ore shoot next month, for it is only 100 feet away. In that ore shoot carbonates ran 48 per cent lead."

NEVADA

The Silver State, published at Winnemucca, whose plant was wiped out by fire on September 13, has received and installed its new equipment, and is again issuing an attractive eight-page paper.

According to report sixteen carloads of blister copper were shipped from the Nevada Consolidated smelter at Ely during the last week of November, leaving less than fifty carloads more to clean up the stock on hand.

A. G. Dodd, while digging postholes south of the river just opposite Elko recently, struck an eighteen-inch ledge of splendid looking ore, which looks like it carries gold and silver. The gold can be seen quite plainly, and Mr. Dodd says that he will develop the find and uncover the ledge.

A Chicago Pneumatic air compressor and 1000 feet of 4-inch pipe and connections have been shipped from San Francisco to the Uncle Sam mine at Eureka. Camp buildings have been completed and upon receipt of the compressor the company will be fixed for the winter's work. D. States is superintendent.

Word of a new strike made at the Roadside mine, in the Freiburg district, reached Ely by a letter to O. E. Ringer from Mr. and Mrs. Carl Ray, formerly of Ely but now engaged in ranching near the scene of the new strike. Details of the new find are not available at this time but it is said that a body of extremely rich ore has been uncovered.

During the past week the new company which has a

process at work to reclaim the values from the Carson river, the result of many years of mining of the richest grade Comstock ores, has been busy sampling and trying up properties, says the Carson Appeal. It is understood that through a new process of recovery it is possible to save the floured or pulverized amalgam that has been found in quantities along the river bed from the Mexican mill to Dayton.

W. H. Venable and J. M. Hayden, of Norfolk, Virginia, who are interested in the Ely Calumet property with Al D. Meyers, arrived in Ely early in the month on a visit of inspection of the mines, which during the past year have developed remarkably well. The mines are now in shape to produce a large tonnage of shipping ore, which will be going to the smelters with the revival of metal prices and lower freight rates.

The Tonopah Extension Mining Company of Tonopah has announced that it had purchased the Cash Boy mine from the Tonopah Cash Boy Mining Company, paying for it 100,000 shares of Tonopah Extension stock, which is equivalent to \$145,000 based on the market value of Extension stock. The deal is one of the most important completed in Tonopah for some time, as it ends litigation involving extralateral rights that would probably have extended over an indefinite period.

A 20-ton Huntington amalgamating mill has been purchased by E. P. Walker of Lovelock and is to be installed immediately at the Hagen Hill mine in Limerick canyon near Rochester. Walker was in Reno recently to purchase pipe for a water line. Walker sold the property, which consists of five claims, to F. G. Stewart, a chemist and wholesale druggist of Chicago, three months ago. Stewart is now in Lovelock and will remain there and at the mine for a while.

The Miller-Hamilton Mining Company, organized in Utah, will soon commence development work on a group of mines located several years ago by H. S. Miller and sons in the eastern part of White Pine county. J. H. Hamilton, of Salt Lake, who was an Ely visitor recently and who is largely interested in the property, stated that P. M. McCree, who has long been in charge of mining interests at Bingham canyon, has been secured to take charge of the work, which will be continued during the entire winter months.

B. H. Kirby, who is associated with Sam Kasper in operating what is known as the Dolomite group of claims located a short distance out from the Pinson ranch near Preble returned from the property near Winnemucca a few days ago. There is a good showing of ore opened in the workings and at the present time a shipment is being taken out. The ore contains black metal and chlorides of silver, and a great deal of the ore being exhibited carries high values in silver with a good percentage of gold. The property is a few miles north from Golconda and is in close proximity to both railroads.

Recent advices from Eastern officials of the Nevada Silver Horn Mining Company indicate that further work will shortly be done on the company's valuable property at Silverhorn, which camp enjoyed merited activity in the spring of this year. Dissensions among the owners of the properties at Silver Horn caused almost complete cessation of development work last July and early resumption will doubtless follow the settlement of these unfortunate differences and renewal of work at the main property will doubtless stimulate the reopening of adjoining properties of known merit.

The Tonopah Divide Mining Company now has its shaft below the 1200-foot level but no water as yet. It reported that the shaft will soon be opened deeper, probably to the 1500-foot level or deeper, where it is hoped water

will be developed sufficient for milling purposes. The property has been producing about 100 tons of \$30 ore for the past year and has great potential possibilities for much greater production in the years to come. H. C. Brougher is president and general manager. George Wingfield is a large stockholder.

The Hudson Mining Company whose property is located in the new Royston district, north of Tonopah, recently closed a deal with New York buyers on four of their unpatented claims, the purchase price being \$45,000. It is understood that this was practically a cash deal. The sale of these claims will give the company money with which to sink a working shaft and for general development purposes. There are at present 29 leasers operating on the Hudson holdings and considerable high grade ore is being shipped by these leasers. Most of the leasers have some ore in paying quantities.

Petroleum Notes

The Producers Oil Co. has opened new offices at 512 Judge building, Salt Lake.

An Albion, Idaho, item says: Finding of considerable gas and some oil in a test drilling for water near the Utah-Idaho boundary line at 110 ft. may lead to prospecting for oil and gas in that district. Location is 5 miles south of Bridge.

Yellowstone Petroleum Co. of Miles City, Montana, has been organized by local parties with a capital of 100,000 shares of a par value of \$1.00. The directors are Charles Boeckman, Mathias Rasque, Joseph L. Rasque and Alfred L. Bolier.

With the purchase of 340 acres of land 3 miles east of Casper for a refinery site, the first substantial step toward another refinery for Casper has been made by the Wyoming Refining Co., the new \$10,000,000 concern incorporated by Wyoming business men.

Ohio Oil Co. has drilled 431 producing wells in Wyoming since its first operations in the state began. Of this number 212 are in Grass Creek, 87 in the Big Muddy, 56 in Elk Basin, 40 in Salt Creek, 30 in Rock Creek, and 6 in Lance Creek. Wyoming has approximately 1,300 producing wells, which shows that the Ohio has drilled approximately one-third of all producing wells in the state.

Local refinery officials in Casper, early in the week says the Wyoming Oil World, received confirmation of an order for 2,000,000 bbls. of gasoline from the Standard Oil Co. of Louisiana to be shipped to Baton Rouge before Jan. 1, 1923. This will mean 84,000,000 gals. of gasoline. At Baton Rouge it will be loaded on tankers for the export trade. The Standard of Louisiana is owned by the Standard of New Jersey.

The Southern Pacific Company's experimental shale distillation plant at Elko, operated for some time under supervision of the U. S. Bureau of Mines, and which was to have been auctioned off to the highest bidder, has been purchased in its entirety by the Catlin Shale Oil Products Company of Elko, the Independent reports. The purchase includes everything at the plant except one retort and boiler.

Personal Mention

Guy Sterling, C. E., has removed his office to 630 Clift Bldg., Salt Lake City.

Arthur D. Storke is the new general manager of the C. O. D. Mines, Inc., of Kingman.

H. J. Gundlach, general manager of the Mine & Smelter Supply Co., was a Salt Lake visitor several days last week.

Kirby Thomas has returned to New York from Gowanda, Ont., and Quebec, where he has been examining mines.

E. G. Reinert, Denver mining man, and former owner of the Denver Mining Record, is investigating Hornsilver and may take over a property there.

F. J. Siebert, formerly with the Goldfield Consolidated Mining Co., succeeded A. L. Chappell on Nov. 20 as manager for the Standard Metals Co. at Peavine, Nev.

J. Fewson Smith, geologist for the United States Smelting, Refining and Mining Co., which owns the Ruby Hill mines at Eureka, Nevada, visited that camp last week.

A. L. Voge, New York chemist, representing the Roessler, Hasslacher Chemical Co., cyanide dealers, was in Tonopah last week and went to San Francisco Friday.

Fred W. Schrott, the "Lucky Dutchman," well known in Utah and Nevada mining circles, is visiting in Salt Lake a few days after a sojourn of two years in the Randsburg, California, district.

Charles W. Stimpson, manager of the Stimpson Equipment Co., of Salt Lake City, has returned from a three months vacation spent in the Hawaiian Islands, and reports having had an enjoyable trip.

Coal Notes

Delivery of seven hundred coal cars to the Denver and Rio Grande in Utah and Colorado begins about the first of the year.

Shipments are picking up considerably from the four camps in the Carbon district of the United States Fuel Company.

The Sunnyside mines of the Utah Fuel Company are going an average of three days a week. Winter Quarters, Clear Creek and Castle Gate are about the same.

B. L. Betcher, who was for a long time prominently connected with the Kemmerer Coal Co. at Frontier, and who resigned early in the fall, has recently been appointed superintendent of the Kinney Coal Co.'s mines at Scofield, Utah.

It is reported that the annual contract between the Oregon Short Line and the Kemmerer Coal Co. has been signed, effective during the next year, which provides that the coal company furnish the railroad 400,000 tons during that period. This indicates a busy, prosperous season for the Kemmerer mines.

It is possible that Cokeville, Wyo., may soon become independent of outside fuel supplies, as a new mine has recently been opened up on Coal Creek, about 12 miles from town and coal is now being hauled into Cokeville for the local trade. Ray Roberts is reported to have leased this property and to have commenced digging and delivering coal in Cokeville at \$6 per ton.

According to geologists the whole of the western end of

Dolores county, Colorado is underlaid with coal. At present there are only one or two places that are being worked and then only for local purposes. But with the advent of the railroad the land will all become valuable as we understand that it is a very desirable grade of coal.—Rico Times.

Big Dividend Announcements

The directors of the Grand Central Mining Company met on the 5th and posted a dividend of $1\frac{1}{2}$ c a share. Books close today (the 15th) and payment will be made on the 20th. This payment aggregates \$9,000. Last January the company paid 1c. a share, or \$6,000, making the total for the year \$15,000.

Rochester Silver Corp. has posted a dividend of $2\frac{1}{2}$ cents for December. The payment date is Dec. 20 and will be made to all shareholders of record, Dec. 5. An extra payment of the same amount is anticipated for January. Total dividend payments for this year are 10 cents, practically a 100 per cent return on the market price which prevailed over the greater part of the year.

A new dividend-payer was added to the list of Utah bread-earners early in the month when the Park-Utah Mining Company, operating at Park City, posted its initial offering to stockholders in the sum of 5c. a share, aggregating \$50,000. Books closed on the 10th and payment is to be made today, the 15th. In making the dividend announcement the management explained that this distribution is not to be taken as fixing a permanent basis for future disbursements. The property has been producing heavily for several months and it was decided that a portion of the accumulated surplus should go out to the stockholders in time for Christmas.

At the meeting of the board of directors of the Silver King Coalition Mines Co., held on the first of the month a dividend of 15c. a share was posted for payment on January 2nd, to stockholders of record December 20th. This is the company's twenty-sixth dividend and calls for the checking out of \$182,415, making the Coalition company's total dividends to date \$4,888,292, while the grand total of disbursements for the properties owned by the corporation foots up to \$15,563,390. The last dividend paid by the company, in the same amount as the one just posted, was on May 2nd last, shortly following the destruction of the company's milling plant by fire. A great old mine that can weather a loss of a plant costing nearly a million, erect a new and better one, and pay dividends of approximately \$365,000, all within a period of less than a year—and still boast a handsome surplus.

During the past week, also, the Utah Copper Company, from New York headquarters, announced the declaration of the fourth quarterly dividend of the year. This distribution calls for 50c. a share, or \$812,245. Books close tomorrow and payment is to be made on the 30th. During the year the company will have paid \$2.50 a share, or \$4,061,225, thus bringing the grand total to date up to \$116,121,877.50, or \$72.75 a share on the issued stock in the corporation. During the war period when copper prices were high, the company paid \$1.50 a share per quarter. When suspension of operations took place last April the company's accumulated surplus was sufficiently large to justify a continuance of dividend payments at the rate stated without the slightest embarrassment. As a matter of fact, when this year opened the company's current assets amounted to more than \$26,500,000, of which considerably over \$22,000,000 was represented in cash, metals on hand and in transit and marketable securities.

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Shippers' Service Letter

and get the details we can give you.

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Gold and Silver.....	\$1.00
Gold Silver, and Lead.....	\$1.50
Gold, Silver, and Copper.....	\$2.00
Gold, Silver, Lead, and Copper.....	\$2.50

SALT LAKE MINING STOCK QUOTATIONS

The range of the market from November 25th, 1921, to December 9th, inclusive. Quotations furnished by J. A. Hogle & Co., direct wires to all leading markets, 169 So. Main St., Salt Lake City, Utah, ground floor of Eccles Building, Ogden, Utah, and Pocatello, Idaho.

CLOSING								CLOSING							
Stock.	Open.	High.	Low.	L. S.	Bid.	Asked.	Sales.	Stock.	Open.	High.	Low.	L. S.	Bid.	Asked.	Sales.
Alta Mich.						.02		Judge M. S.					2.10		
Antelope Star						.01	500	Keystone						1.00	
Alta Con.						.02		Lehi Tin.	.01½	.01½	.01½	.01½	.01½	.02	10,000
Alta Tiger								Leonora	.01½	.01½	.01½	.01½	.01	.01½	3,000
Albion Cons.					.03	.06½		Logger						.01	
Am. Con. Cop.	.01	.01½	.01	.01		.01	9,500	Lynn Bix Six	.06	.06½	.06	.06½	.07	.09	3,625
Alta Tun.	.12½	.12½	.10	.10	.09½	.10½	24,800	Monzonite						.01½	
Addie					.02½	.30		Mammoth						.50	
Bullion						.05		Miller Hill						.02	
Big Hill					.01½			May Day					.01		
Big Cot. Coal.	.04½	.04½	.04½	.04	.04½	.05	1,000	Mason Valley					1.00		
Beaver Cop.							4,000	Moscow						.05	
Bell Silver	.62	.63	.61	.63	.62	.63	7,600	Mich. Utah	.08	.09½	.08	.09½	.09½	.10	36,311
Black Metal	.10	.10	.08½	.08	.06	.09	5,500	New Quincy	.07½	.07½	.05½	.06½	.06	.06½	68,500
Bingham Gal.	.04½	.05½	.03½	.04	.04½	.04½	88,500	Naildriver					.03	.20	
Cent. Eureka						.02		No. Standard	.03½	.04½	.03½	.03½	.03½	.03½	41,500
Cedar Talis						.04		O. K. Silver						.03	
Colb Rexall	.14	.14	.10	.10½	.11	.13	5,700	Ophongo							
Colorado Con.	.02	.02	.02	.02	.01½		500	Original Ban.							
Crown Point	.03½	.03½	.03	.03½	.02	.02½	2,900	Ohio Copper					.05		
Croff	.92	.92	.92	.92	.85	1.00	100	Plutus						.20	
Cott. King								Prince Con.	.06	.06½	.05½	.06	.05½	.07	8,450
Cott. Metals						.04		Pioche Brist.							14,000
Daly				1.00	1.00			Prince Mining	.03	.03	.03	.03	.03	.04	1,000
Daly West					1.60			Provo	.01½	.01½	.01½	.01½	.01	.01½	7,000
Dragon	.03	.03	.03	.03	.02		600	Rds. Pk. Cons.						.01½	
Demijohn Con.					.01			Rico Well							
Empire Silver					.01		23,000	So. Standard	.12	.12	.12	.12	.12	.12	3,000
Empire Mns.	.02	.02	.02	.02	.02	.04	1,000	Sells				.02	.02	.02½	
E. & B. Bell					2.25			Syndicate							
Emerald	.01	.01	.01	.01	.02		1,000	Sil. King Coal.	2.30	2.30	2.05	2.05	2.05	2.15	1,100
Eureka Mns.	.04½	.04½	.04½	.04½	.04	.05	1,000	Sil. King Con.	.53	.55	.51	.51	.50	.52	3,871
E. Crown Pt.	.02½	.02½	.02	.02	.02	.02½	5,000	Sioux Mns.						.02	
E. Tin. Coal.					.01	.01	8,000	Swansea Con.						.03	
East Tin. Con.					.06	.08		So. Hecla Ext.	.01	.01	.01	.01	.01	.02	2,000
Eureka Lily	.06½	.07	.06	.06½	.06½	.07	3,500	Silver Shield	.04½	.04½	.04	.04	.03	.04½	4,000
Eureka Bul.	.03	.03½	.02	.03	.02	.02½	28,937	Tar Baby					.02	.02½	
Gold Chain					.04	.08		Tin. Central					.01	.01½	
Grand Cent.					.24			Tin. Standard	1.97½	2.02½	1.95	1.95	1.92½	1.95	5,195
Great Western					.42			Uncle Sam						.01	
Hamburg Mns.					.04			Utah Con.						.04	
Howell	.04½	.05½	.04	.04½	.04½	.05	9,700	Union Chief						.03	3,000
Home Run					.01	.05		West Toledo	.02	.02	.02	.02	.01	.03	
Iron Blossom	.19	.22	.19	.22	.20	.21	1,700	Walker Mng.	2.60	2.70	2.60	2.70	2.62½	2.70	300
Indian Queen						.06½		Woodlawn	.06	.06	.06	.06	.05	.07	500
Iron King					.05			Yankee Con.					.01		
						.06½		Zuma	.03½	.03½	.02½	.02½	.02	.03½	5,000

ORE SHIPMENTS

Ore shipments from the Park City district during the two weeks ending on the 9th amounted to 4,231 tons, as follows:

Judge Allied Companies	2,139
Ontario Silver Mines	856
Silver King Coalition	1,236

Total tons 4,231

During the two-week period ending on the 9th the mines of the Tintic district produced and shipped 336 carloads of ore from nineteen properties, as follows:

Tintic Standard	113
Chief Consolidated	85
Victoria	33
Dragon Consolidated	29
Eagle & Blue Bell	18
Iron Blossom	20
Colorado Consolidated	8
Empire Mines	5
Centennial-Eureka	1
Swansea Consolidated	7
Gemini	4
Alaska	2
Bullion-Beck	2
Gold Chain	1
Sunbeam	1
Mammoth	4
Showers Consolidated	1
Tintic Drain Tunnel	1
Plutus Dump Ore	1

Total carloads 336

EASTERN STOCK QUOTATIONS, DECEMBER 10

Bingham Mines	.12½	.13½
Daly West	.01½	.02½
Utah Apec	.02½	.03
Utah Con.	.01½	.02½
Cerro de Pasco	.34½	.35½
Butte & Superior	.18	.18
Chino Copper	.27½	.28½
Inspiration Copper	.39½	.40
Nevada Copper	.14½	.15
Ray Con. Copper	.14½	.15
U. S. Steel	.83½	.83½
Utah Copper	.63½	.64½

METAL MARKET QUOTATIONS, DECEMBER 10

Silver	99¼c.
Silver in London	35¼d.
Copper	13¼c@14c.
Lead (New York)	\$4.70@4.80
Zinc (East St. Louis)	\$4.90@4.95

ASSESSMENTS PENDING

Iro Kning, 1c. a share. Delinquent December 23. Sale day January 20.
American Metals Mining, ¼c. a share. Delinquent January 2. Sale day February 3.
Eureka Bullion, ¼c. a share. Delinquent December 20. Sale day January 17.
Big Cottonwood Coalition, ¼c. a share. Delinquent January 6. Sale day February 4.

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The Salt Lake Mining Review

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SINGLE COPIES, 15 CENTS

OIL PROBLEMS OF THE UINTA BASIN. (III)

By Prof. Earl Douglass*

In the last article—the second in the series—the first thing designated in the plan to be followed was:

“A.—If there are surface indications of oil, begin with these and ascertain their condition and significance.”

Petroleum, or “mineral oil,” is a very complex compound. It is called a hydrocarbon because it is composed of the elements hydrogen and carbon. As only two elements are involved one would naturally suppose that organic chemistry—a study of the hydrocarbons—ought to be easy, but these two elements enter into so many peculiar combinations that the study is often difficult and confusing.

It is desired to introduce here, only enough of the chemistry of the problem to enable those who are interested in oil to realize the significance of the surface showings enumerated and defined below.

We say that the chemical formula for silica is Si O_2 . That means that silicon and oxygen are combined in the proportion of one unit or “atom” of silicon to two of oxygen. But you can not give a simple chemical formula for petroleum or the substances which are derived from it, as gasoline, benzine, kerosene, lubricating oil, commercial paraffine, asphalt, gilsonite, etc. This is confusing to those who have studied inorganic chemistry and who know, for example, that lime or calcium carbonate is Ca CO_3 and that gypsum is calcium sulphate or Ca SO_4 . These are definite things but the hydrocarbons are complicated mixtures of compounds of hydrogen and oxygen.

One unit, or “atom” of carbon will unite with four of hydrogen (C H_4) and you go on adding each time one unit of carbon and two of hydrogen and you will get a series like this: C H_4 (methane), $\text{C}_2 \text{ H}_6$ (ethane), $\text{C}_3 \text{ H}_8$ (propane), $\text{C}_4 \text{ H}_{10}$ (botane), $\text{C}_5 \text{ H}_{12}$ (pentane), etc., and you can make a series up to $\text{C}_{60} \text{ H}_{122}$ (dimyricl) and each has a pretty name which you can learn if you wish.

The first four of this series are called permanent gases because they do not liquefy under ordinary conditions. Beginning at these gases go on up the series and at $\text{C}_6 \text{ H}_{14}$ (heptane) and $\text{C}_7 \text{ H}_{16}$ (hexane) you have two compounds that form gasoline, though the composition of the gasoline which you buy depends on the refinery in which it is made higher in the series, part of which enter into the composition of kerosene. Up at $\text{C}_{20} \text{ H}_{42}$ you get the solid called paraffine and the whole series is called the methane series or the paraffine series.

But this is only one of the series of compounds which come from petroleum. For example there are two series composed of carbon and hydrogen in the ratio of one to two as $\text{C}_2 \text{ H}_4$ up to $\text{C}_{30} \text{ H}_{60}$. One is unstable (decomposes readily)

and is called the olefine series. The other is the naphthalene series. There are several other series which we do not need to consider here.

Below is given an arrangement of the bitumens—the division of the hydrocarbons to which petroleum belongs—with the definitions of each. Prof. Eldredge classified coal under the solid bitumens, but it is said that the bitumens derived from coal are not the same as those derived from petroleum. In the classification given here coal will be omitted but the possible relation of coal to petroleum may be discussed later.

After this classification, the conditions in which the bitumens derived from petroleum occur in nature will be enumerated and the terms, as they will be used in these articles will be defined. It is difficult without consulting many books, to get a systematic understanding of the tables—they should be preserved for reference.

The Hydrocarbons

Hydrocarbons—Compounds of hydrogen and carbon.

Bitumens—The hydrocarbons occurring in nature as natural gas, petroleum and its derivatives, residues, etc.

Gaseous Bitumens

Marsh Gas—Methane C H_4 . Emanates from volcanoes, petroleum wells, etc. Occurs in coal measures and forms part of the fire damp of coal mines. Formed in marshy districts from decomposition of vegetable matter under water. Can be produced by destructive distillation of organic matter.

Natural Gas—Composed of the permanent gases (gases that do not liquefy at ordinary temperatures) methane (marsh gas) (C H_4), ethane ($\text{C}_2 \text{ H}_6$), and propane ($\text{C}_3 \text{ H}_8$), with small quantities of butane ($\text{C}_4 \text{ H}_{10}$) pentane etc., higher in the paraffine series.

Liquid Bitumens

Petroleum—An inflammable, oily mixture of various hydrocarbons, chiefly of the paraffine series, which occurs in the rocks.

Viscous Bitumens

Mineral Tar—Dark colored, viscid, oily residue of partly dried or inspissated petroleum.

Mineral Pitch—Brea, chapapote. Thick, tenacious black or dark brown substance from the distillation of mineral oils. Related to mineral tar.

Elastic Bitumens—Elaterite (mineral caoutchouc) an

*Geologist, Jensen, Utah, for several years engaged in exploratory work in the Uinta Basin country.

elastic, dark brown, resinous subtranslucent bitumen found in soft masses.

Solid Bitumens

Asphalts—Uintaite (gilsonite). Black, brittle conchoidal fracture, pencillate next to walls of veins, brown streak and powder. Easily fusible in candle flame, burns and acts like sealing wax, stringy when soft. Partly soluble in chloroform and in ether when powdered.

Wurtzilite—Massive, compact. Appears jet black on surface but thin plates deep-red, brilliant. Thin plates or sharp corners can be lighted with match or candle. Becomes soft and does not pull out in strings like ozokerite or gilsonite.

Nigrite—Brilliant. Jet black, streak black. Not easily fusible. Structure cuboid or massive. Fracture conchoidal to cuboidal.

Grahamite—Brilliant, pitch black, streak and powder dark chocolate brown, fracture cuboidal to brittle. Partly dissolves in ether, wholly in chloroform. Endures a temperature far above asphalts in general. Behaves much like coking coal.

Albertite—Jet black, brilliant, pitch like, streak black, powder black to faint brown. Incipient in candle flames, softens in boiling water. 4 per cent dissolves in ether.

Cereous Bitumens

Ozokerite—"A waxy translucent mixture of natural paraffins occurring usually in coal-measures, sometimes in such quantities as to be mined with profit. It varies in composition between $C_{18}H_{38}$ and $C_{25}H_{52}$, and is colorless to white when pure, but otherwise often leek-green, yellowish, brownish-yellow or brown and when brown sometimes greenish by transmitted light. It is used extensively as a purified paraffine for various purposes." (Stand. Dict.) Fuses at 56° to 63° . Soluble in chloroform and some varieties wholly soluble in ether. Some have questioned whether ozokerite is derived from the liquid petroleum.

In the above arrangement it should be noticed that we began with the lighter gases—the so-called permanent gases. These may be found in petroleum if there has been no opportunity for them to escape. Some of the lighter members of the series, those which form gasoline, kerosene, etc., may also escape under certain conditions, for example when they come in contact with the atmosphere or with warm temperature, and this leaves a thickened residue which becomes oxidized, thus forming mineral tars, pitches, paraffine residue, etc. This process may go farther and produce harder asphalts which find their way into crevices forming dykes of gilsonite, grahamite and other vein-hydrocarbons. The paraffines in a similar way may form veins of ozokerite.

We speak of petroleum as having an asphalt base or a paraffine base. Most oils have both, but these terms simply show that one or the other predominates.

Indications of Oil, Etc.

Below is a list of "oil indications," "oil signs," or "oil showings" which indicate the presence of petroleum in deeper strata. This list can undoubtedly be improved and it should not be taken as a model. It is given here in order that the reader may know the meaning of terms as used in these papers. An endeavor has been made to make this list as complete as possible, but additions will undoubtedly need to be made later.

Although the list is so large, it is a startling fact that nearly all—and probably all of these "showings" occur in the Uinta Basin.

(1.) *Gas Indications*—A hydrocarbon gas such as marsh gas, or natural gas in rocks, or coming from the ground often

with water is likely to be an indication of petroleum. The gas should be tested as there are other gases which have different origin. Even marsh gas (H_4) often comes from water where there is decaying vegetation.

(2.) *Mud Springs*—*Mud Volcanoes*. *Mound Springs*. These may appear on level ground with solid earth around. They are usually caused by gas escaping upward from oil bearing strata beneath. They often build up mounds around them and when there is much gas it sometimes accumulates and escapes violently throwing mud and even rocks to a considerable distance.

(3.) *Oil With Water*—Oil may occur in or on water which comes from the ground and has been in contact with oil-bearing rock.

(4.) *Oil Seeps*—Where oil is slowly oozing from dirt, or oil-rocks.

(5.) *Oil Springs*—Where oil with water is issuing from the ground or rocks.

(6.) *Oil Rock*—Any rock which contains oil or serves as an oil-reservoir. It may occur in any porous or fissured rock where oil can escape to it from other oil-bearing rocks.

(7.) *Oil Sands*.—Sands which are impregnated with oil. Under favorable conditions these may be productive reservoirs.

(8.) *Petroleum Shales*—Shales which contain "mineral oil," or petroleum. The term "oil shale" has been used to designate shales containing oil and also shales which may not contain petroleum but which yield a somewhat different quality of oil by destructive distillation. The term as generally used now applies to the latter. It is very essential in these articles that the shales containing oil or its residue be sharply distinguished from those which yield oil only by destructive distillation. As the latter oil has been named *kerogen*, I propose to call the shales *kerogen shales*. The latter, if purely of this type, is of course, not to be considered as an indication of petroleum.

(9.) *Original Petroleum Shales*—I know of no term to distinguish the shales which are the original source of petroleum. A word could be coined like *oleogen* shales but this, though shorter, is not easy to pronounce and would not be generally understood. The longer term is self explanatory. We have the term "black shales," but the shales which give rise to petroleum are probably not always black.

(10.) *Asphalt Shales*—Shales which contain the thickened heavier portions of oil either from evaporation of the lighter oils or from the taking up or absorbing of the heavier portions of the oil by the shale and allowing the lighter portions to pass on.

(11.) *Mineral Tar*—The thickened and oxidized residue of petroleum resulting from the loss of the more volatile constituents by evaporation or inspissation, leaving a large percentage of asphaltic material. It occurs in nearly all the ways in which the original petroleum occurs, that is, in seeps, in water which issues from springs, in sandstones, sandy shales, porous-limestones, etc.

(12.) *Mineral Pitch*.—Perhaps more commonly applied to the residue of oil which is more thickened than mineral tar. Asphalt-rocks are those containing asphaltic residue as:

(13.) *Sand Asphalt*, or asphaltic sandstone.

(14.) *Asphaltic Limestone*.

(15.) *Asphaltic conglomerate*, etc. Asphaltic shales have been defined in another place.

(16.) *Asphaltic Veins or Dykes*—Fissures containing the various hardened asphaltic residue of oil, as elaterite, gilsonite, grahamite, albertite, wurtzilite, etc. Those may occur in various forms of openings in the rocks where conditions are favorable.

(17.) *Paraffine residue* in or on rocks is usually an indication of petroleum.

(18.) *Paraffine Spots*—Often in the parting planes of

shale which contains oil, or has contained it, light colored spots of paraffine are seen.

(19.) *Burnt Rock*.—Sandstone, shales, etc., are often changed in color—reddened for example—by the burning out of coal or oil. The question as to which is the cause can usually be determined in the field.

The above are direct indications of oil. The presence of other minerals such as sulphur and sulphur compounds, seeps with impregnations of common salt and other minerals, salt-water in wells, etc., which may, or may not be associated with oil, are also common in the Uinta Basin.

In the next paper we will begin a consideration of the surface "showings" of the territory to be studied, beginning with gilsonite. To make the articles more interesting and more clearly understood diagrams and photographs will be freely used.

Erata.—In Article II (Dec. 15, 1921), page 14 column one near bottom instead of "Marvelous love" read *marvellous lore*.

WARREN DISTRICT, IDAHO, IS NOW ATTRACTING CAPITAL

Ed. Mining Review: Through the efforts of the Warren Commercial Club the goldfields of this mining section are attracting wide attention of outside mining men and capitalists. Several Los Angeles people have recently become interested in the future of this camp and they now are organizing mining companies to develop many of the rich gold and silver properties known to exist in this district for several years, but which have lacked capital to open them up and make producers of them.

George W. Cooper, one of the Los Angeles mining men who made investigations here several months ago and who satisfied himself as to the merits of a number of properties here and the unusual gold and silver values contained in the ores which are practically untouched he decided, with some associates who joined him later, to make this camp the seat of future operations

The Cooper combination already has taken a bond and lease on the Thomas Creek gold placer property formerly owned and operated by Charles Curtis and W. G. Grindle. This property comprises an area of about 320 acres of land of which practically 290 acres are virgin ground which it is estimated will yield better than 30c in gold per cubic yard. The overburden ranges from approximately six to eighteen inches of soil only, leaving about nine feet and more of pay dirt. Samples from one yard of virgin ground on this property, assayed on November 17, 1921, by the Smith-Emery Co., well known assayers and metallurgists of Los Angeles, gave the following results: Gold, 484.60 ounces per ton, or \$10,016.68; and carrying also 22 ounces of monazite sand per yard of dirt. The Thomas Creek placer property will now be operated by the Co-operative Mines Company of Warren, Idaho, with headquarters in the Warren camp.

Several other companies also are organizing to develop and operate other properties in the camp as soon as spring rolls around again. One of these companies will develop and operate the monazite sand deposits of this district, which covers an area about eight miles long by four miles wide, for its contents of thorium, mesothorium and other valuable by-products. Mesothorium is today known the world over as a substitute for radium and the Warren deposit of monazite sand is considered so far the richest known deposit throughout the West.

With these several mining companies organized and operating in the near future, the Warren camp will again take its former rank among the numerous rich mining sections of both the county and the state of Idaho.

S. J. POINTON.

Warren, Idaho county, Idaho, December 20, 1921.

SCHOOL FOR PIONEER OF MINES

Washington State College, Pullman, Dec. 23.—"Without doubt civilization has been developed on a metallic basis, and the miner has been the real pioneer of industry and of empire," says Dean L. O. Howard of the school of mines and geology at the State College of Washington.

On January 2, this school opens a twelve weeks session for these pioneers of industry, giving to anyone who can read and write intelligently and has a serious purpose (and can do ordinary sums in arithmetic) a chance to study mining, geology, assaying, ore testing, metallurgy, mineralogy and mine surveying.

The idea is to help men (one must be 21 years old to enter) who are interested in mining but have not had the time, money, or previous schooling to take regular college courses in mining and metallurgy.

The work is done more in the laboratories than in the class recitation, as it is the idea of the faculty that the men



A Corner in the Laboratories at Pullman

should "learn by doing" in the assaying, surveying, drafting, chemistry, ore testing, etc. One may specialize on any subject that most interests and may at the same time attend any lecture on the college campus that sounds attractive.

The library offers a special attraction to those who have been where they could not get books on their specialties, for it contains practically all the standard works on mining and metals in the English language, current numbers and bound files of the important mining journals and other technical periodicals and reports.

Those who complete the work satisfactorily will be granted a certificate signed by the heads of the departments, stating what work the student did.

In the mining building the larger mining and metallurgical machinery is installed, with the class rooms, museum, drafting rooms and general offices. Machinery and apparatus for sampling, making amalgams, concentration, smelting and cyaniding are there, as well as a complete flotation testing laboratory where students may test their own ore. The laboratories for assaying and metallurgical work are in College Hall, and Science Hall houses the department of geology, with its blow pipe, mineralogical and petrographic laboratories and museum.

There is a very complete collection of typical rocks and minerals of the western states. If you have found something that looks valuable, and you do not know what it is, why not take it to college with you and find out? It might make your fortune.

CIRITICAL SHORTAGE CRUDE PETROLEUM SPELLS BOOM IN OIL INDUSTRY

"The production of crude petroleum in the United States has apparently reached its maximum and from now on with minor fluctuations will tend to slowly decline," said Mr. Joseph E. Pogue, a consulting engineer of New York, whose new book, "The Economics of Petroleum" has just been published by John Wiley & Sons. After a thorough-going analysis of the petroleum situation throughout the world, Mr. Pogue concludes that the United States is facing a critical shortage of crude petroleum which can no longer be compensated by imports from Mexico, and the coming year will see sensational developments in the petroleum industry.

"The United States," continued Mr. Pogue in a recent interview, "has maintained a rapidly mounting supply of petroleum over the past few years because of a remarkable coincidence of circumstances that the years ahead give no promise of duplicating. Between 1916 and 1920, the petroleum industry became the receptacle of profits made in all lines of endeavor to the amount of over three billion dollars.

"The investment of this sum in oil gave rise to an unprecedented expansion in the petroleum industry and stimulated production to such a degree that the peak of output which was normally due around 1919 was projected into the middle of the industrial depression in 1921. Coupled with this rapid expansion from within the termination of the great war made available sufficient tanker transportation to open up the cumulative results of a ten years' drilling campaign in the oil-fields of Mexico. A growing flood of Mexican oil, in consequence, poured into the American market, at the same time that domestic production reacted upward from the stimulus of the vast sums of new capital invested in oil production.

"Such was the situation at the beginning of 1921," continued Mr. Pogue. "Then things began to happen. Oil prices tumbled in the face of a temporary slump in demand. Pool after pool in the Mexican fields went to salt water, some almost over-night. The effects of war profits on domestic oil-field development began to wear off; drilling declined. Now demands are again on the upswing; but where are the needed increases in oil supply to come from? Advancing prices for mineral oils will seek an answer to that question. The exploitation of foreign fields will be speeded up. But still the question persists.

"Since its inception, the output of the American petroleum industry has expanded at an average rate of $8\frac{1}{2}$ per cent a year; during the past few years this rate increased to around 10 per cent. In 1921 the United States will consume almost exactly 510 million barrels of crude petroleum. With our industries reviving, 1922 will call for 550 million at least. With domestic production declining and Mexican output strongly curtailed, there can be but one result—rising prices and a stringency in supply.

"What effect will the developments you outline have upon the price of oil-stocks?" Mr. Pogue was asked. "What effect have previous oil-booms had?" he replied. "The first effect, however, is apt to be far different from the ultimate effect. But that is a long story. All I can say here is, oil will soon be in the limelight. Petroleum represents one of the biggest problems in sight today."

CARBON BLACK

The demand for carbon black, which is produced from natural gas, has greatly increased during recent years, but the supply of natural gas is rapidly decreasing, a fact that is viewed with no little alarm by the producers and consumers and that has brought about a general demand for information on the subject. Accordingly, in 1919 the United States Geo-

logical Survey began a canvass of the situation, and the result of this canvass is a report entitled "Carbon black from natural gas in 1920," by E. G. Sievers.

Although there has been an increase in the number of plants in operation, the total production of carbon black in 1920 decreased 1.4 per cent, the decrease in West Virginia being 11 per cent and in Wyoming, Montana, and Kentucky combined 4 per cent. There has also been a marked decrease in output in Pennsylvania and Oklahoma, for Oklahoma produced none at all in 1920. The output in Louisiana, however, increased 32 per cent in 1920. The Monroe gas field in Louisiana, which has an enormous supply of gas, has attracted the carbon black industry, and unless checked by legislation the production of carbon black in Louisiana will increase greatly.

In spite of the fact that West Virginia's output showed a great decrease for 1920, it still remains the leading state in the production of carbon black. West Virginia is followed in order by Louisiana, Wyoming, Montana, Kentucky, and Pennsylvania. Louisiana, however, is making great advances in the production of carbon black, and its output may soon exceed that of West Virginia. There is less demand in Louisiana for natural gas for fuel, but in West Virginia and Pennsylvania the consumers have demanded that the supply be reserved for domestic use. This fact, together with the development of large supplies in Louisiana and Wyoming, has caused the carbon-black industry to move to the states where there is at present little demand for natural gas.

Carbon black is a fluffy, velvety black pigment, frequently confused with lampblack, which is gray in color and which is produced from oil or other carbonaceous material. For many of its uses carbon black is superior to lampblack in quality, but for some uses, as for certain pigments in paints, lampblack is superior.

Carbon black has been used as a pigment in printer's ink instead of lampblack since 1864. It is also used as a coloring and reinforcing material in the rubber industry and is extensively used in the paint trade.

About 10 per cent of the carbon black produced annually is used in the manufacture of stove and shoe polish, phonograph records, black leather, bookbinders' board, buttons, carbon and other black and gray papers, typewriter ribbons, carriage cloth, celluloid, electric insulators, cement colors, crayons, drawing and marking inks, artificial stone, black tile, and tarpaulins.

The exports now amount to 15 per cent of the output, but before the war they amounted to 33 per cent. They will probably never again reach this amount, owing to the increased demand in the United States for carbon black.

SOME BIG FIGURES AND IFS

If the American Dollar had been in existence 5,000 years ago—

If Adam had lived until the year A. D. 1921—

If he had saved \$1 every 10 minutes from that time to the present—

He would have accumulated a reserve fund sufficient to finance the expansion of the Standard Oil Co. of New Jersey from 1919 to the end of 1920. During that period, according to the Wall Street Journal, the Standard expended \$250,000,000 for that purpose. The figures are so big that they can be comprehended only by comparison.

If Henry Ford had presented Methusaleh with a tin Lizzie—

If Methusaleh had driven the car 100 miles an hour day and night with Standard Oil gasoline for 900 years at 25 cents per gallon—but what's the use. Just take our word for it that \$250,000,000 is a lot of loose change.

PLANNING FOR BIG OPERATIONS— AT THE OLYMPUS MINES, FREIBERG

If plans now rapidly maturing are consummated during the winter, as expected, the Olympus Mining & Milling Company with splendid properties in the old Freiberg district, Nevada, will make a noise in the mining world during the year to come. This statement is vouched for by Manager J. Petrulas, who spent a few days in Salt Lake about the middle of the month, previous to leaving for Chicago and Washington.

During the past year the Olympus company's property was equipped with compressor, air drills and other machinery calling for an outlay of \$15,000 or more and, before returning to the mines to open the spring campaign, plans and estimates for a milling plant, including the testing of ores for the purpose of determining best methods of treatment, will be given particular attention.

The company's property embraces forty-two claims in all. Of these eight are patented and a portion of the ground was owned and operated by the late Judge C. C. Goodwin forty years or more ago. The present company started work on the properties in 1914, seven years ago, and since that time numerous shafts and tunnels have been sunk and driven to prove up the value of the ground. This work has demonstrated a large tonnage of commercial ore, much of which is high grade, carrying 25 to 165 ounces silver and 40 to 78 per cent lead.

The tunnel which now is being driven to open up the main ledges on the property and through which, most likely, most of the mining will be done for some time to come, was in a distance of 300 feet when Manager Petrulas left the mine. At 225 feet the first of three parallel veins was tapped. It disclosed five feet of good silver-lead ore. At 270 feet the second vein, seven feet thick, was encountered, and the values there were equally as good or better than those disclosed in the first vein. The third, or main ledge, which discloses a width of forty feet in surface and shaft workings, is expected to be encountered in the tunnel within a short distance. With this connection made, the company is ready to begin regular production, with six faces of ore to begin with.

The camp of Freiberg is located about 90 miles south of Ely and about 70 miles northerly from Caliente, on the Salt Lake-Los Angeles railroad, and the latter will most likely be the shipping point for all supplies in, and crude ore and concentrates out, to the smelters, as the roads are first-class for truck hauling.

The official roster of the company embraces well known Utah and eastern men. Dr. Chris Petrolas, of Chicago, is secretary-treasurer of the company. Congressman E. O. Leatherwood is president, and J. Petrolas, S. Staes, of Price, Utah, and J. Lambros, are the other local directors. E. H. Williams, of Ely, Nevada, is superintendent.

DIVIDEND BY TINTIC STANDARD

As decreed by the board of directors several days ago the Tintic Standard Mining Company will tomorrow pay a dividend of 5c a share to stockholders of record on the 28th. The amount called for by this disbursement is \$58,735.95, and brings the year's total up to \$176,207.85.

According to information given out the company's milling plant capacity is to be brought up to 200 tons daily at once, by the addition of the two new roasters which were placed in commission a few days ago and which makes the total number of roasters now utilized in the plan nine.

Recent daily operating reports of the mill show silver precipitation slightly in excess of 8,000 ounces a day, which is at a rate in excess of 1,000,000 ounces a year. Recovery of the silver content of the ores is running from 83 to 85 per cent. Copper precipitation is around 1,000 pounds a day, the

recovery ranging from 50 to 62 per cent. Lead and gold recoveries as yet are small but electrolytical equipment for recovery of these values is at the mill and is to be installed shortly.

Throughout the year a large amount of dead work has been done in the mine such as backfilling old stopes to eliminate further danger or trouble from caving stopes. Not any waste has been hoisted to the surface this year, more than 7,000 tons a month having been put into old stopes. As a result physical condition of the mine is excellent and expense of this nature will be nominal from now on since the back filling will be kept up to date hereafter. Heretofore so little waste had been handled that there was an insufficient amount to meet the needs of the mine.

Development work has been carried ahead with excellent results. In the block of ground from which all production so far has been mined the ore horizon was extended from the 1250 up to the 1000 level. Before this year no ore had been mined from above the 1250 level at which depth the first commercial ore was struck.

A drift in the quartzite on the strike of the fissure channel has been sent out 500 feet to the northeast from number 2 shaft. It is projected to the site for the proposed number 3 shaft to which point it has an additional 1000 feet yet to go. The fissures show strong mineralization. The drift is opening new ground.

RICH SILVER DISCOVERY NEAR COLVILLE

Silver ore said to run \$800 to the ton has been discovered on the C. N. Smith homestead four miles north of the Old Dominion mine, 10 miles northeast of Colville, Wash., between the middle and south forks of Mill creek.

Mr. Smith, while building road, uncovered a stringer four inches wide. He continued digging to a depth of 10 feet, the stringer widening. He secured an assay which showed \$6.60 in silver. He obtained assistance and sunk a shaft 30 feet. At this depth the ledge was eight feet wide and he reports it gave an assay of \$800 in silver to the ton. There is a well defined hanging wall on the east, but no showing of a foot wall. The outcrop shows for a quarter of a mile northeast and southwest and stringers seem to be running from the west to the granite wall on the east. There is some nickel and cobalt reported in the ore, with considerable iron, but not much lead.

At the DeSota mine, recently discovered five miles north, picked samples of ore are said to run as high as \$400 in silver.

CALIFORNIA'S 17th ANNUAL MINING REPORT

The California State Mining Bureau announces the issuance of its Seventeenth Annual Report, prepared under the direction of Fletcher Hamilton, State Mineralogist, which covers all recent mining activities.

In spite of the depression and inactivity of some branches of the industry, the annual value of more than fifty mineral products of California shows a production of a quarter of a billion dollars. This is an increase of more than one thousand per cent in the past thirty years. Mr. Hamilton states that a surprisingly large number of inquiries are received at the Mining Bureau, evidencing a distinct revival of interest in all branches of mining in California and particularly in gold mining.

To mining men, as well as to those thoroughly familiar with the mining situation in California, this publication will prove a revelation as showing the present vast mining possibilities of California which are broader and more attractive today than they were in the days of the Argonauts.

The report is attractively bound in cloth, comprising six hundred pages and may be secured by addressing the State Mining Bureau, Ferry Building, San Francisco. The price of the publication is \$1.75 including delivery charges.

SOUTHERN NEVADA CAMPS REVIVING AS RESULT OF ORE PRODUCTION

By A. J. Moore

Reno, Nev., Dec. 20.—One of the best examples of a change of attitude towards mining is that of the New York Herald. Up to very recently the New York Herald was the leading "Highbrow" newspaper to decry mining and everything and everybody connected with mining. Recently, in no unmistakable terms it pointed out the dire necessity of further development of the mining industry particularly gold and silver mines. It paid a most flattering tribute to the oft despised prospector. In its argument in favor of mining investments it was pointed out that 253 American mines had paid in dividends the great sum of \$625,000,000,000, and aptly asked if any other industry could make as good a showing. The change of attitude on the part of the New York Herald is only one example of the change of sentiment regarding this great industry particularly in the East.

As pointed out in a recent article the public is not in the market. They never come in until the big fellows have gone in and begin to boost prices. A good example of that is right at hand, near Reno. The Bulkley Wells outfit will spend over \$2,000,000 on the United Comstocks property before a wheel is turned. Do you suppose that \$2,000,000 could ever be gotten from the public for that project? But when the United Comstock Mines Company stock is listed on the New York Curb they will then buy it on a rising market.

Right alongside of the United Comstock Mines Company is another project for which it is said \$1,500,000 has been promised. Within the past few days A. L. D'Arcy is credited with having raised in the East the needed funds to finance the Orleans Hornsilver; Fenwick & Co., of Tonopah, are interesting Eastern capital in the Rosetta Divide and Goldsmith Divide which have recently taken claims in Hornsilver. The Wilsons, H. D. Cooper, the Walker Bros. of Salt Lake City and others have invested in the new camp of Royston with the intent of turning prospects into mines.

A very good example is that of the Super-Six Mining Company. It was composed of a bunch of good practical miners holding some of the most choice leases in the Royston district. They tried to raise money from the public. They wrote letters, advertised and in proportion to the money expended the undertaking was a failure. The public did not respond. The Wilsons came into Royston to look the camp over. Among other properties examined the Super-Six, with the result that they bought an interest and put up the money to go ahead and develop the leases.

Royston Has Fine Surface Showing

The camp of Royston today presents the very best surface showing seen in Nevada in many a year. The area of the camp is spreading and all one can say of the depth is that at no point has the ore pinched and on the Hudson one shaft has gone to 300 feet on an incline and about \$100,000 was taken out in the sinking. Then the claims got into litigation and no work was done until recently when W. H. Royston, after whom the camp was named, got the contending parties together and effected a compromise. Then the leasing system was put in vogue with the result that there is now about 300 tons of high grade ore ready for shipment. One delay in shipping has been that everyone is waiting for the opening to traffic of the All-Nye-County road. This shortens the haul about four miles and cuts grades.

The most recent deal in Royston is the sale of the west five claims of the Hudson Mining Company to a combination of New York and San Francisco capitalists. The five claims sold include the Storm Cloud, Aztec, Sunnyside, Seventy-six, and Fraction Four. It is said that these five claims

will be divided into holdings for two companies. On several of these claims lessees are taking out high grade. A. Homer Black has the north 500 feet of the Sunnyside, Briz Putnam has the middle lease on the Sunnyside and Nording & Mellberg have the middle 500 feet of the Seventy-Six and Mr. Wills the one adjoining. Silver & Jones have a 1,000-foot block on the Storm Cloud and Aztec. The claims sold are a part of what was known as the Quincy group and their ownership was disputed owing to overlapping of surveys when located. This matter was adjusted when Royston got the various parties together and settled this and all other contests.

The seven claims sold by Briz Putnam and W. L. McGregor to M. L. Cooper of San Francisco have been incorporated into the Royston Piedmont Mining Company. The principal stockholders to date are M. L. Cooper, Granville Moore, A. A. Hocheimer, and C. S. Gillman.

The Ben Hur Divide Mining Company which recently bought the Kincaid-Smedley lease on the C. O. D. claim of the Hudson Mining Company has three feet of ore that will break down at from \$150 to \$200 a ton, it is claimed. A portion of the vein will show around 500 ounces. The shaft is only down 15 feet but the ledge is said to be traceable on the surface for 185 feet.

Paper Boom Days Over in Nevada

The day of "paper" booms in Nevada is over. Today every camp is looking to and entirely dependent upon ore. The new camp of Hornsilver is making a showing that should satisfy the most exacting investor. The new ore body on the 700-foot level of the Orleans puts that company into the big production class. The Hornsilver May Mining Company, the Rosetta Divide, the Goldsmith Divide and the Hornsilver New Orleans each give good promise of opening ore bodies that will take them out of the prospect list.

We all know what Tonopah is doing. Since the labor troubles were settled each company has gotten back to its stride and in some instances production has been increased.

The Tonopah Divide has reached the 1200-foot level and a station has been cut at that point. The shaft is still going down and was sunk 12 feet below the 1200-foot station last week. The Divide Extension has developed a fine body of ore that can be shipped at a profit. The Gold Zone is now shipping and the New Alto Divide is preparing to follow up the leads of the ore from the Gold Zone and Tonopah Divide. The Ben Hur has secured claims over in Royston and also bought control of the Kincaid-Smedley lease which is already producing high grade.

Then there are the Tonopah Hasbrouck and the Kernick Divide of which A. A. Busey is president and A. A. Codd, secretary-treasurer. They have just issued an exhaustive report on both properties setting forth the amount of work done, its character and future prospects of the two companies. From this report it appears that the Kernick Divide has a shaft of a depth of 930 feet and in lateral work 449 feet of drifting and 2,782 feet of crosscutting making a total of 4,161 feet of exploration work.

The Hasbrouck report shows a shaft depth of 360 feet, length of crosscuts 4378 feet, drifts 3002 feet, depth of winze, 90 feet and 180 feet of exploration by raises. This gives a total of 8010 feet of exploration work. With the reports is a map showing the plan of the underground workings and their relation to the development of the two properties. In concluding his report on the Hasbrouck, Secretary Codd says the crosscut tunnel, which by agreement between the two companies, is driven from the bottom of the Kernick 900 foot shaft, has now been driven a distance of 1279 feet, at which point a flow of water was struck and which is now being passed through. This is a splendid indication that the main Hasbrouck ledge is close at hand. In driving this crosscut

numerous stringers of ore were cut which gave assays from a few dollars up to as high as \$400.

Over at Argentite W. W. Watterson, president of the Natural Soda Products Co., is developing the Frances mine which is under option from W. A. Sanger and F. H. Taylor. The shaft on the property is now down 100 feet and will be sunk another 100 feet and about 300 feet of drifting will be done. It is said that the 100-foot shaft is in three feet of \$35 ore. From the shaft north and south drifts have been run each 100 feet long. The north drift taken across five feet showed \$2 values and the south drift shows \$24 which at a depth of 50 feet has 33 feet of \$12.00 ore and the Neil & Shively group where a 70-foot dyke has been crosscut showing an average of \$3.20 for that distance.

Recently a deal was put through whereby the group of claims adjoining the Ecklund-Paget holdings was taken over by F. B. Mechlin of the Nevada-California Power Co., Prof. Bennett of the Tonopah School of Mines, Robert Neil, W. A. Sanger and F. H. Taylor. They will start development work as soon as buildings and equipment can be put on the ground.

Camp of Eureka Striding Along

One of the old camps that has revived to an extent that it is assuming the aspect of a new camp is the old time sensational camp of Eureka. Eureka was famed not only for the rich ore produced but has the distinction of being the first to successfully smelt silver-lead ore in the United States. The first equipment along this line was in 1866 and resulted in failure. In 1869-70, Major W. W. McCoy and Col. G. Collier Robbins, experimenting with draft and blast furnaces, turned failure into success.

In 1871 the Richmond Mining Company of London purchased the claims adjoining the Eureka Consolidated on Ruby Hill and began the erection of smelting furnaces. In 1878 there were 16 furnaces in blast, reducing from 1000 to 1500 tons of ore daily. The Eureka country around produced all of the natural fluxes required for the reduction of ore. There are great quantities of iron, silica, lead, limerock, etc., all necessary in the economic reduction of silver-lead ores. Eureka became the smelting center for all of the mines within a radius of 90 or 100 miles. Then refining was added to the smelting operations. Later improved smelting methods were in operation at outside points which together with a reduction in freight charges to Salt Lake City, the pinching out of the rich ore above the water level, and the downward tendency of price of silver led to the closing of the Eureka camp.

Now conditions have taken another swing, bringing about the revival of Eureka as a big silver-lead producer. Last summer Walter Harvey Weed, one of the famous mining engineers of the country, together with two other engineers, made an examination of the Eureka Croesus and recommended the erection of a smelter along modern lines. Meantime the United States Smelting Company had been trying many experiments on Eureka ores at their Midvale, Utah, plant. The new board of directors of the Croesus will follow Dr. Weed's recommendation. Meantime the Eureka Holly has worked out a plan of milling and sulphidizing the lead carbonate ores.

Uncle Sam Making Ready to Cut Loose

The Eureka Uncle Sam has also employed Engineer Rosenshine and he has devised a plan for handling the ores of that mine.

Only a few days ago there arrived at Eureka several carloads of pipeline, rails, fuel oil, a complete assaying plant and an electric lighting system for the Uncle Sam. Among the machinery was a Chicago-Pneumatic air-compressor of four drill capacity. Boarding houses and machinery housing will be completed in a few days and a comprehensive plan of development work will be started. It will include about 3000 feet of crosscuts, drifts and raises. Raises will be put up at three points and run through to the surface following ore bodies already exposed in the tunnel. One of the sensational pro-

ducers of the early days was the Old Hamburg.

The Uncle Sam endlines on the Hamburg. The rich ore in the Hamburg is said to have been extending into the Uncle Sam ground when the endline was reached and work had to be suspended.

During the winter months all high grade broken down in exploration work will be shipped to Salt Lake City but in the spring the new reduction plant planned by L. J. Rosenshine will be completed and all ore over \$5 will be treated at the new combination mill. Frank T. Torpey, president of the Eureka Uncle Sam Mining Company, states that the company is now well financed for the winter development work and that includes the payments for the large amount of machinery and mine supplies just brought in. He claims to have one of the most efficient assay plants in the state employed at a small mine. All of the underground workings will be lighted by electricity. A large amount of mill grade ore along with some high grade has been mined or blocked out. It is the intention that this winter's work will develop and block out enough ore for a long mill run.

Eureka Holly and Paddy Pride

The Eureka-Holly has opened up two bodies of high grade in the south stope one is about four feet wide and the other three feet. W. A. Barnes and his brother K. B. Barnes, each large stockholders, recently paid the camp a visit and made a thorough inspection of the Holly. It is on their recommendation that the milling process will be introduced. The Bullwhacker is making a good showing from the 430-foot level.

Down near the rim of Death Valley there is the Paddy Pride mine that now is shipping ore to Salt Lake City at the rate of one car each week. Shipments are made from the little station of Zabriski on the T. & T. R. R. The President of the company, John T. Overbury of Tonopah, deserves great credit for the persistency he has shown in overcoming the many obstacles in his way. Even water tanks had to be erected at Zabriski, storage for gasoline, etc., provided and the ore is delivered to the auto trucks by the roadside by a 300-foot tramway from the mine. While shipments will be kept up at the rate of one carload a week, only such ore will be shipped as is broken down in development work. He is planning for a mill later. In fact plans for a 150-ton mill are now being drawn.

All the work so far has been from the 300-foot level upward. The shipping ore will show an average of about \$65 a ton. A new ore body with a length of 70 feet has just been opened on the 250 or intermediate level with both faces of the drifts in ore. It is the purpose of President Overbury to soon put the Paddy Pride into the dividend class.

PLENTY OF PETROLEUM SAYS SINCLAIR

Fear of an exhaustion of the world's supply of petroleum is a "bugaboo," says Harry F. Sinclair, chairman of the board of directors of the Sinclair Consolidated Oil Corporation.

"There is plenty of petroleum and always will be," asserted Mr. Sinclair at the Petroleum Institute's meeting. "The great question we are confronting is this: Is America willing to pay the price for an adequate share of the world's supply?"

"America is still the chief producer of petroleum, but the day is coming when American fields will not be the largest producers and when American refiners who do not fortify themselves in foreign fields will be forced to take a minor place in the refining industry of the world.

"Unless America is willing now to pay the price of preparedness she will lose her position of petroleum supremacy and other countries will force her to 'pay through the nose.'"

Mr. Sinclair said that in the last six years American oil companies had drilled an average of about 26,000 new wells each year in this country, of which about 7,000 were "gassers" or dry holes.—New York Curb.

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ANNUAL ASSESSMENTS ON MINING CLAIMS

Notwithstanding all the explanations that have been made concerning the performance of annual assessment work on mining claims there is, apparently, a good many miners who do not yet understand the situation. The Mining Review has recently been receiving letters in which the writers asked to have the matter again explained to them, so here goes.

Just about a year ago now a resolution was adopted in congress and signed by the president which extended the time for doing the annual assessment for 1920 six months, or to the first day of July, 1921. Following that action by congress, early in August last, an amendment to the mining laws which permanently changed the annual assessment year period was passed and became a law. So that, beginning six months ago, the assessment period began with July and ends June 30th next. The six months' extension relief bill only applied to 1920 assessments. All claim owners have until the end of June, 1922, in which to do their 1921-22 annual labor.

This permanent change in the law was made so that claim-owners would not be compelled to get out in the dead of winter to perform belated assessment work and protect their claims. The fiscal year now ends June 30th, all the time, or until again changed by law.

GETTING READY TO "GO"

Every scrap of information obtainable during the past few days has been favorable to the belief that the copper mines of Butte and Utah will be in operation during the month of January, rather than by the first of April, as has been generally accepted as "starting" time. This month will close with the copper metal surplus trimmed to probably not more than 150,000,000 pounds—an amount that may be entirely wiped out by the end of January, and certainly before it can be replaced, even if the mines cut loose during the coming month. Anaconda officials are a little reticent on the matter of setting the time for resumption, but they all admit that it is close at hand, and that they do not expect to ever again be compelled to close their mines as a result of metal market conditions. There is said to have been a "gathering of the clans" of Utah Copper in San Francisco during the present week, and it is believed locally that plans for resumption by that company have been formulated, or are being formulated, at that gathering. Butte should be running "wide open" inside of thirty days. Utah Copper, it is believed here, will also be under way by the end of January. Let's t-o-l-l out the old and RING IN THE GLAD NEW YEAR.

The Mining Review is pleased to note that mining papers all through the metal mining states are taking up the slogan: "Buy something made of copper." Manufacturers will hear of the demand before long, and then we shall be able to convince the world that the slogan means something. Keep at 'em.

It was a great shock to the people of Salt Lake when the announcement of the death of Sidney J. Jennings was made Wednesday morning. His death followed a surgical operation of a delicate nature on Tuesday. Mr. Jennings was the general purchasing agent of Utah Copper and other Jackling companies and was highly esteemed by everybody. He was a most prominent member of the Masonic order and a sterling citizen and member of society. He leaves a wife and five children, a brother and sisters. He was 49 years old.

As this year of our Lord, 1921, flickers out a sense of relief will be felt at its passing. It has been a trying period for most people in all walks of life, and in kissing it goodbye there will be few to shed a tear of regret at the parting. In a few hours the mighty hosts of this nation will be greeting the dawn of a new day and a new year that is confidently relied upon to speed the pace at which we shall return to a state of "normalcy" so devoutly prayed for. There is a world of sunshine and prosperity just ahead. Let us all help to make it brighter and more realistic.

MIDWEST GEOLOGISTS FINISH FIELD WORK

Harry A. Aurand and W. S. Makaroff, geologists for the Midwest Refining company, were in Moab Sunday, having come in their car from Shiprock, N. M. They had been doing reconnaissance work on the Navajo reservation all fall. They mapped a structure south of Bluff, measured stratigraphic sections near Towac, Cortez, Mancos and Durango and did considerable work on the Dolores fold, northwest of Dolores. Stratigraphic sections were measured near Shiprock, where the Midwest is reported to be preparing to sink a test well. Aurand and Makaroff have been in the country south of Moab for about two months.

Aurand and Makaroff left Monday for Grand Junction, where they will leave their car, and will then proceed by rail to Denver to remain for the winter.—Moab Times, 22nd.

MASON VALLEY SMELTER TO BE ENLARGED

By Al H. Martin

With Tonopah producing approximately \$650,000 per month, the new camps of Reservation, Royston and Hornsilver driving rapidly to the front, the Mason Valley Mines & Smelter Co. preparing to expend \$500,000 to \$750,000 in new additions to its Thompson smelter, and Goldfield, Austin, Pioneer, Candelaria, Manhattan, Pioche, Virginia City and other old camps entering on new productive periods all indications are favorable for a tremendous mining revival in Nevada during 1922.

Resumption of smelting at Thompson means a renewal of work at scores of mines throughout western Nevada, idle for years because of inability to market their ores. The Thompson plant is to be provided with reverberatories and other equipment for smelting of silver-lead ore, in addition to the copper and gold-bearing material formerly treated. It is also reported the company may manufacture its own coke from the coal developed in the Darms property at Coaldale.

Reservation, Royston and Hornsilver promise to be the stellar Nevada camps in 1922 from a spectacular standpoint. At Reservation remarkably rich discoveries of gold and silver-lead have been made recently, and numerous strong and persistent orebodies demonstrated. Developments in this field have gone forward quietly for the past five years, largely handicapped by lack of funds. Strong interests are commencing to enter the district, and the field promises to loom large in the mining world before many months have passed. The district is about two miles from Schurz, a station on the Southern Pacific line, near the upper end of Walker Lake.

The shaft of the Goldfield Deep Mines has passed the 1120-foot mark and is still in the C. O. D. vein, first encountered at 1030 feet. The shaft entered the ledge at a steep angle. The gold content is steadily improving with depth. Lateral work will be deferred until the shaft enters the Goldfield Consolidated ore channel at an approximate vertical depth of 2400 feet. Goldfield Development Company has officially confirmed the report that the west segment of the massive vein in the Gold Hill mine is 23 feet wide with the ore averaging around \$10 gold. Crosscutting has started from the 200 level of the shaft to locate the east segment.

Jack Cahill, discoverer of high-grade gold ore in the Birch Creek district, twelve miles east of Austin, announces the finding of high-grade carnotite ore in the Cahill Lode and Nevada Birch Creek mines. Carnotite is the principal known source of radium, and the discovery has stirred considerable excitement in the Birch Creek field.

MARKET ASPECT OF UTAH COPPER STOCK

The Boston Commercial of the 17th instant discusses the market aspect of Utah Copper shares as follows:

Utah Copper, as was to be expected, assumed the leadership in the copper advance. From a low price last week of 58½ it sold above 66. The low price for Utah Copper this year was 41½ made at a time when there were fears that the dividend was to be passed. At 66 Utah Copper was 24¾ above its low. In 1920 the stock sold as high as 80¾, comparing with a high of 97½ in 1919 and an extreme high of 130 in 1916.

Utah Copper's property is closed down tight. The company is maintaining 50 cents a share dividends quarterly out of accumulated surplus. Inasmuch as Utah Copper is a thoroughly developed and rounded out enterprise today and that the company distributed only a portion of its large share earnings of the "war years," the directors have felt it only fair to

stockholders that dividends be maintained at a limited rate during the 1921 period of extreme depression.

The company closed last year with a net surplus of cash and quick assets of \$21,108,147. This included a metal inventory of \$10,597,103 (copper valued at cost, or about 13.145 cents). A considerable portion of this metal has been turned into cash this year. The company has distributed in dividends \$4,061,225, which, together with certain other write-offs, expenses, etc., probably brings the present working capital of Utah Copper down to around \$16,000,000, a sum ample for all ordinary purposes.

The Utah Copper management apparently has no intentions of resuming operations until it is an assured fact that once started they can continue at a gradually increasing rate of operations commensurate with the tuning up of equipment and the assembly and placing of something like a normal working force.

Utah Copper has the capacity for handling 12,500,000 tons of ore annually, or an output approximating 200,000,000 pounds. In the first year of operation after resumption an output approximating 50 per cent of this capacity probably is all that can be expected. If the demand for copper increases next year, as is now expected, and mining companies, such as Utah Copper, delay operations, there will be a period in which demand will invite the speeding up of production. To get results in the type of enterprise such as Utah Copper there must be large operation.

Utah Copper made its copper in 1915 at a cost of 6.612 cents a pound. Under anything like normal conditions it has always been a slow cost producer. It will have the benefit of a wage scale closely approaching the pre-war level. Supply costs are down but not to the pre-war level. Freight rates will be higher than in pre-war times, but considerably lower than in 1920. There may be some improvement in taxes. Costs and output for the first year of operation are mere conjectures. Not even the management has any definite idea what can be accomplished in either of these things. Yet it seems likely that Utah Copper might get costs down below eight cents a pound on a scale of operations considerably below capacity. Such favorable operating conditions and metal prices around 17 cents would provide attractive share earnings. The stock is discounting such prospects.

SOAP DEPOSIT FOUND NEAR LEHI

Considerable interest is being manifested over a deposit of mineral soap in the Loke Hills that was discovered by Thor and C. Cedarstrom. The product is a white clay substance and closely resembles soap in appearance. There is said to be an immense deposit, a shaft having been sunk fifteen feet in the vein without reaching the foot wall. The claim is located in Goshen Pass just west of Mosida.

Geologists who have examined the property say that it is of volcanic origin having been deposited in the bottom of a prehistoric lake and animal life which added potash, phosphate and other elements to the aluminum and silica which form the chief component elements.

Its close resemblance to commercial soap led Mrs. Cedarstrom to experiment with it by using some animal and vegetable oils with the final result—the production of a most excellent toilet soap.

A Berlin newspaper has calculated that the German debt of the allies—132,000,000,000 gold marks would weigh, in 20-mark gold pieces 52,000 tons. To transport it, eighty-five freight trains of forty trucks each would be needed, the journal estimated.

Around the State

The New Quincy continues to extract ore from the workings with the small force employed. Another shipment will be marketed this week. It is very reasonable to suppose that the New Quincy will not always be classed with low priced stocks, says the Park Record.

On the 1450 of the Silver King Coalition an important ore find was made recently, according to reports from camp, but new ore bodies are becoming so common at this big producer that they only cause smiles from the management and not the least flurry of excitement.

Work has been temporarily suspended on the north drift of the Park Utah, which will ultimately have its outlet in Deer Valley, says the Park Record. An upraise is now being made to connect with the Hawkeye shaft. Reports from the property today are to the effect that ore conditions continue to improve with development.

The Allison brothers of Heber City are again devoting their time to the development of the Lucky Shepherd property, which is located near Desert Mountain, to the west of what is known as the West Tintic District. This property caused some little excitement several years ago when some sheepmen found a vein of very good ore, getting high values within a few feet of the surface.

Articles of incorporation have been filed with Clarence Cowan, county clerk, and with the secretary of state by the Idaho Phosphate company, of which James A. McIlwee is president. The company has a capital stock of \$600,000, divided into shares of \$1 par value. E. A. Culbertson is vice president, and Samuel K. Kellock, secretary-treasurer. Other incorporators are James Prinsen, Darwin Haddock, George W. Lambourne and Thomas B. Trent.

Manager John Bestlemyer states that on the 800 level of the Eureka Bullion property a drift is being sent out toward the south for the purpose of cutting an east and west break, which shows plainly on the surface but which has never been developed to any extent underground. Already about 160 feet of work has been done and Mr. Bestlemyer believes that the break can be reached within the next thirty or sixty days.

It is understood that on the 1100 and 1500 of the Ontario drifts are being run to prospect eastern holdings of the company with the hope of catching the continuation of the marvelous Ontario vein that was cut off by an immense porphyry dyke in the long ago, and which likely has been cut by the Park Utah. There will be a lively stir in the eastern section of this district in the coming "good old spring and summer time."

The transportation system of the Alta Tunnel and Transportation company is now fairly well organized, and the result is shown in the increasing tonnage of ore delivered at the smelter. Four lots, with a total gross weight of about 225 tons, were shipped during the first half of December. All of this ore came from the one stope at the top of the No. 3 raise. No. 4 raise, 150 feet east of No. 3, and an intermediate raise between Nos. 2 and 3, are being put up toward the ore bedding. The intermediate raise, although up only forty-five feet, is already in strong mineralization, with nodules of first class ore. The No. 4 raise has just been started.

The North Standard Mining Company held its annual meeting on the 20th. About 640,000 of 1,000,000 shares were represented. After a complete report of the operations at the mine since its organization had been made by Manager John Manson, a statement reviewing all financial affairs of

the company was read by Secretary John Dorius. Both of these reports, it is said, were unanimously accepted. Two members of the board of directors, Frank L. Copening and L. A. Marks, were elected for the year. These, with Dr. Charles F. Wilcox, John H. Manson and John Dorius, constitute the directorate. Conditions at the property, which is situated in the East Tintic district, reports Mr. Manson, are unusually favorable. In drifting upon the 1100-foot level to expose the intersection of the north-south fissure being followed with an important east-west cross-break, a large body of iron ore has been broken into, according to Mr. Manson.

Personal Mention

Walter W. Wishon has recently been making an examination of the Greenback mine, near Grant's Pass, Oregon.

Edward R. Zalinski, E. M., has recently returned to Salt Lake from a professional mine examination trip into Mohave county, Arizona.

William Greenway, of Reno, Nevada, has been visiting Arizona mining properties in company with his brother, Col. John C. Greenway, of the C. & A.

L. S. Breckon, who recently returned from Cerro de Pasco, Peru, has been appointed general superintendent for the Consolidated Mascot Mines Corporation at Hailey, Idaho.

H. B. Worden, vice-president of the Rewood Manufacturers Co., of San Francisco, was in Salt Lake for a few days recently visiting the local agency of the company—the D. C. Dunbar Company.

Robert J. Goodwin, E. M., who has been leasing at the Florida Mountain Mining Company's properties, near Silver City, Idaho, for a year past, was a Salt Lake visitor during the month.

J. D. Shilling, general superintendent of the Utah Copper mines, at Bingham, and who is wintering at National City, California, spent a few days at the company's mines early in the month.

A. H. Cowie has resigned as general manager of the Utah Fuel Co., and has been succeeded by A. R. Baldwin, president of the Western Pacific Railroad Co. which controls the Utah Fuel Co. It is not expected that Mr. Baldwin will hold the general management of the fuel company more than temporarily.

Trade Notes

A. R. Lundin and J. L. May recently purchased the property and plant formerly owned by the late Hyrum A. Silver of this city, at 454 W. Fifth North St. and will hereafter conduct a general foundry and machine business at the newly-acquired holdings under the name of Lundin & May Foundry & Machine Co.

Larger rolls and a new ball mill are being installed at the property of the Sunshine Mining Company in the Big Creek district of the Coeur d'Alenes. The plant is closed down while the changes are being made. A new compressor with a capacity of 550 cubic inches per minute, is being installed and the company is putting up a two-bucket tram. The changes in the mill will increase its capacity to 70 tons a day and the tram will enable the company to take out its ores from the Nos. 3 and 4 levels. This company and the Big Creek Mining Company, are jointly constructing an 11,000-foot flume to pick up the water used in the concentrators and carry it beyond the intake of the water system of Kellogg.

In Nearby States

ARIZONA

Chas. Bly and associates have erected a small stamp mill on their property in the Chemehuevis mountains, out from Franconia, where they are treating a good grade of gold ore. —Kingman Miner.

Property of the Hercules Silver Mining Company, in the Wallapai mining district, will be sold at public auction on January 3, 1922, to satisfy a judgment obtained against the company for \$235.25.

During its present suspension the Greene-Cananea Copper Company is carrying on an extensive campaign of underground and surface development and improvement. They are remodeling and enlarging the mill adding to it a daily capacity of 500 tons.

The work of concreting the Dallas shaft of the C. & A. in the Bisbee district was recently completed. The shaft was concreted from the surface of the bottom, a distance of 1600 feet. A number of ore pockets were included in the work.

The Gold Trails mine is now working two shifts on the shaft they are sinking to the 500 level. They have passed the 400 level. On the 275 foot level a crosscut disclosed the vein 21 feet wide, four feet of which averaged \$18.35 in gold. At the 500 they will crosscut and drift. —Kingman Miner.

On Thursday, December 1, the first cars of ore from the Big Jim mine passed over the new tramway to the United Eastern mill at Oatman. It is proposed to mill only about 50 tons daily from the Big Jim at present. This will be gradually increased as the daily tonnage from the main ore body of the old mine is increased. The visible ore reserves in the Big Jim mine are estimated at close to \$2,000,000. This does not take into consideration anything found below the 600 level.

So far the diamond drilling done by the Oatman United in a northeasterly direction from the 600 foot level has been very satisfactory. They have tapped the vein at different points and are at present drilling at a sharp angle to encounter the ledge at greater depth. It is expected the vein will widen out and show a decided improvement in values.

The big mill of the C. O. D. Mines, Inc., has resumed operations and will handle a large daily tonnage of ore. W. Rith is in charge of the mill, which is one of the most complete concentrating plants in the state. At the mine from 45 to 50 men are employed on development and ore extraction. The main shaft has reached a depth of 500 feet and the ore-bodies are being opened on that level with excellent results.

The Live Oak mine of the Inspiration Consolidated in the Miami district, is producing a considerable quantity of silica. Some of this is being put through the test leaching plant of the Inspiration company, and the balance is being shipped from Live Oak to the International smelter, where it is being used for fluxing purposes.

J. A. Stickles is busy purchasing and hauling the new equipment to the Oatman-Arizona property. When they start work it will be with an up to date modern plant all ready for development on a large scale. Considerable surface exploration has already been done on the ground. One shaft is down 150 feet. In the open cuts along the ledge they found high grade values. About the first of the new year they expect to be set up ready for sinking. The mine is located about one mile southeast from the Tom Reed.

BRITISH COLUMBIA

Development is being resumed on the True Fissure mine at Trout Lake, where the lower tunnel has reached values in proving the principal vein at depth. The mine is working a day and night shift.

The Nugget Gold Mines has struck the original Nugget vein in the deep tunnel driven from the Mother Lode mine, according to recent reports. Rich ore has been disclosed. The strike was made at a point in the tunnel 1600 feet from its portal and on the side of the mountain occupied by the original Nugget group.

Reports received at Spokane, Wash., are that stoping is being carried on at the Bosun mine, a zinc-lead property in the New Denver district and that a crew of 30 men have recently been employed, principally for work on the vein struck some time ago and which shows high values in lead, zinc and silver, the latter running as high as 180 ounces to the ton, in patches. The old vein also maintains consistently high values.

Owners of the Monarch mines at Hall, ten miles from Nelson, on the Great Northern railway, have decided to test their property by diamond drilling. The Monarch group is a copper proposition carrying some gold and silver values. Surface outcrops have been traced for a considerable distance showing widths up to 50 feet and indicating immense ore bodies. These bodies will now be tested for depth, extent and values by a series of diamond drill bores.

Development work is being pushed rapidly on the Ark group, near Duck Creek, according to reports recently received at Spokane, Wash. The main vein, which is 50 feet wide, has been crosscut from foot to hanging wall and a 15-foot ore face exposed. Drifting has recently started on the vein, which is revealing higher values as the drift is pushed ahead. A fair tonnage is on the dump. The property, which is situated for cheap transportation carries good values in gold, silver and copper.

Two tons of ore, less than a good sized truck load, from the I. J. L. mine at Roseland recently brought Roseland owners \$12,300, a report from the smelter at Kellogg, Idaho states. The shipment, the richest ever received at the smelter, was of gold ore, carrying nearly 296 ounces to the ton, and 47.5 ons. in silver. With the bonanza ore was shipped 29 tons of ore characterized by the owners as second grade, but which would be considered first class in most mines. The 20 tons netted approximately \$1700, making the total value of the car nearly \$14,000. Another shipment of high-grade and second-class ore is said to be nearly ready. Eight employes of the Consolidated Mining & Smelting Company of Canada will enjoy the great benefit that comes from the rich strike, for they are working under a lease.

COLORADO

President A. E. Moynahan of the Louisiana-Colorado Mining Company, owning the Dolly Varden mines, has had mined several carloads of ore that, shipped as broken, is reported returning about 60 ozs. silver, while sorted ore runs over 300 ozs. to the ton, with low gold and lead content in addition. The Dolly Varden has in the past produced many millions of ounces of silver.

Messrs. Bertram and Thompson, who are operating the Wynman group on Anvil mountain just outside the town limits of Silverton, have finished cleaning up the crosscut and drifts and are now mining ore that returns over eighty ounces

of silver in addition to small values in gold and commercial quantities of lead to the ton. The ore is in what is known as the "north drift" and occurs in a vein about six feet in width.

Discovery of ore assaying as high as \$600 a ton is claimed by prospectors who have been prospecting an abandoned mine at Mount Vernon. These prospectors claim that assays made in Denver show that the ore contains gold, vanadium, silver, copper, iron and radium. S. C. Zink, L. M. Smith and J. W. Stephenson are the prospectors and they have obtained a 15-year lease on the claim and intend to organize the Mount Vernon Mining company. They plan to send the ore down a chute to the base of the mountain and then haul it to the Intermountain railroad spur, one and one-half miles distant.

IDAHO

The North Bunker Hill Mining Company, in the Coeur d'Alenes, is drifting west on the big vein and is near an ore shoot, according to recent reports. Two shifts are working and advancing six to eight feet each twenty-four hours.

The Ajax Mining Company of Spokane has started work on the mile of tunnel which it will drive at a cost of \$90,000 to reach a point directly under the ore shoot in the upper works. The property is in the Hercules neighborhood of the Coeur d'Alenes.

The Hecla Mining Company recently declared a dividend of \$170,000, which is at the rate of 17 cents a share. This disbursement increases the dividends for the year to \$670,000 and the grand total of dividend payments to \$9,005,000. Operations are proceeding steadily at the properties of the company, situated at Burke and Gem.

The Blue Bird mine located on Blacktail mountain, which shipped ore last spring, has entered into negotiations with the Northern Navigation Company to ship a carload of ore every week. The vein that is being worked has widened from a few inches to three feet. Messrs. Coleman and Ward are the present lessees.

The east drift of the Imperial mine in the Burke district of the Coeur d'Alenes has been extended over 200 feet. The full width is said to be well mineralized with lead crystals and galena scattered through the ledge matter. The drift is about 100 feet from the point where the management expects to encounter an ore body opened several years ago.

According to reports one of the richest strikes ever made in the property has recently been encountered in the Bay Horse mine, eight miles west of Huntington, and 120 miles from Boise. Expert mining men familiar with silver properties claim that the strike is destined to develop into one of the largest in the history of the west. There is now blocked out in the Bay Horse mine large quantities of ore that runs 50 ounces silver to the ton.

Reports from Wallace, indicate that the recent strike of four feet of ore on the 400-foot level in the Chicago-Boston mine, two miles west of that town, is about the most important in the Coeur d'Alenes made recently. Assays of the four feet of ore returned 11.2 per cent lead and 11.5 ounces in silver, and in the middle of the four feet is about one foot of ore that assayed 48 per cent lead and 42 ounces of silver. The strike is 350 feet east of the shaft and gives a depth of about 1,200 feet.

In sampling ore to determine the character of mill to be built, the Giant Ledge Mining Company of Spokane has received word from the property in the Coeur d'Alenes that average samples from a stope are showing better than when

the tunnel went through the ore body. "Samples of this ore have been sent in to our office in the Peyton building, Spokane, and are the best we have had," said W. W. Johnson, secretary-treasurer. "It is fine looking ore and I am sure will run better than \$50 to the ton. We have several shoots of ore that will be sampled. These stopes are on the 400-foot level and as the same kind of ore was found in going down from the surface for 140 feet we are confident the ore extends from the surface to the tunnel level."

NEVADA

The recent shipment from the Florence mines at Stampede Gap, near Pioche, netted the owners \$42.00 per ton, the ore assaying 24.1 ounces in silver and 41 per cent in lead. Work will be resumed in the spring.

Work was resumed this week at the Wedekind mine four miles east of Reno under the direction of C. H. Dennison. The company is extracting some high-grade galena ore carrying good values in silver and will soon make a shipment to a Utah smelter.

Alex Baird, state deputy mine inspector, who visited Lake valley during the month, states that the work on the mill which is now under the management of Ed Millard, is progressing very rapidly and will be completed and the mill ready for a try-out within a few weeks. The plant is modern in every respect.—Ely Record.

W. C. Ralston, the well known mining engineer now engaged in recovering values from the Carson river near the Eureka mill accompanied by Chester Barton as chauffeur, left Dayton early in the month on an examination trip for some mining properties situated south of Rawhide. They expected to be gone several weeks.

C. D. DeLorme who is operating the Lincoln Hill mine, in Lower Rochester, recently completed a mill run on some high-grade gold ore and announces the purchase of an electric hoist which will be installed on the winze in the lower tunnel. The winze is 85 feet deep, sunk on the vein and in good ore. Sinking is to be resumed as soon as the hoist is installed.

Superintendent Edward Klaus of the Oest Mining Co. states that a car of machinery has just been unloaded at the mine in Silver City, which is part of hoist and compressor equipment to be installed at that property. It was the first of several cars of machinery now on the way, which will provide this well known mine with up-to-date facilities for the extensive operations planned by the company, of which Engineer Leon M. Hall is general manager.—Virginia Chronicle.

Recent visitors to the Packard section of the Rochester district bring reports of a rich lens of ore having been found in the main tunnel of the Nevada Packard mine which yielded several tons of \$90 ore. The mill is reported to be treating over 6,000 tons a month. The mine is under the management of Frank Margrave, receiver, who was one of the original organizers of the company and for several years served as secretary.

An examination has been made by Bureau of Mines engineers of development work on a deposit of lignite near Reno. Preliminary experiments looking toward possible beneficiation of the material have been made. The shaft is about 45 feet in depth and discloses a seam of lignite at least 30 feet thick at the opening. The material improves with depth, and it is hoped that it may be available as a domestic fuel after briquetting and possibly as a power fuel in the vicinity of Reno.

Notwithstanding the adverse reports and the doubts entertained as to the existence of platinum near Winnemucca, a

small stampede last evening and this morning followed the receipt by Frank O'Leary and George Wallace of assay returns showing high values in platinum taken from the vicinity of the Pedrolí ranch. The assays were made by the Silver State Chemical company. It is estimated that twenty or more autos rushed to the vicinity immediately after the assays were given out and a large number of locations were made.

Development work of a highly interesting character is being conducted by the Comstock Tunnel & Development Company at a point in the Sutro tunnel 16,000 feet from the portal. A drift is being driven along a large dyke that is cut by the tunnel in quartz showing low values. The object of the prospecting is the rich ore body found in the old Baker mine, now known as the Comstock Phoenix. The work is at a depth of approximately 1,500 feet and is the first prospecting to be undertaken in the tunnel in late years.—Nevada Mining Press.

O. W. Jones, president of the Rochester Silver Corporation and the Nevada Sunshine Mines Company, after spending some time here looking after the latter company's developments in the Sunshine district, sixteen miles south of Winnemucca, departed for his home at Chicago. Mr. Jones is well pleased with the ore showing made on the Sunshine estate and has great faith in the outcome of the property. Considerable development work has been done on the holdings and a fine body of rich ore is now being followed in the workings.

L. D. Gordon, president of the Round Mountain Mining Co., and H. G. Mayer, secretary, are in Round Mountain for the cleanup of the long tail race at the placer diggings, which will complete work for 1921. This has been the best season the company has had for several years, due to a good supply of water, which was conserved by use of the new Blue Jacket dam. The company expects to recover a total of about \$125,000 in placer gold with the final cleanup. Operations began in March and have been continuous with one and two giants at work.—Nevada Mining Press.

The first car of lead-silver concentrates from the new flotation mill of the Simon Silver-Lead mine was shipped this week to the United States smelter at Midvale, Utah. A car of zinc concentrates will be ready for shipment within a few days to the company plant at Harbor City, California. After a four days shut-down pending some adjustments of the electric power line, and the installation of a larger motor for operation of the flotation machines, the mill resumed operations with one shift. Two more shifts will be added and the plant brought up to maximum capacity.

WASHINGTON

Mines of Republic, Wash., have shipped more than 2,000 tons of ore to the smelter at Trail B. C., during 1921.

Republic ores are wanted by smelters for their value for fluxing. For this reason they pay a pretty good price for them.

As a result of the recent placer gold discoveries along Peshastin creek in the vicinity of Blewett, several mining claims have been staked out along the banks of Peshastin and Nigger creeks.

Richard Marsh, mining engineer and assayer of Spokane, has taken a contract to build, install and superintend a cyanide plant which the Keller Copper company will construct at its property, twelve miles north of Keeler. Mr. Marsh will start construction at once. The cyanide plant will

handle at least twenty tons of ore a day, and the company already has a mill with a daily capacity of forty tons a day.

Reports at hand are that Spokane men have recently organized the Federal Iron and Steel Corporation, and have secured extensive holdings of iron deposits near Tekoa. An iron furnace will in all probability be built at that place in the near future. J. C. Haas is president and general manager; F. M. Handy, vice president, and Louis M. Moss secretary-treasurer, all of Spokane.

The 26th Annual Winter Mining Session of the College of Mines, University of Washington, will be held during the 12 weeks from January 5th to March 22nd. This session is open to any interested man who can read and write English. The expenses will be limited to a tuition fee of \$15.00, laboratory deposits to cover materials actually used and the cost of the necessary text books. The training consists of lectures with laboratory practice, for which the laboratories of the College of Mines are thoroughly equipped.

Construction Notes

The town of Las Vegas, Nevada, is seeking information that will aid it in determining whether it can afford to install a municipal gas works plant.

L. D. Adams, of Kingman, Arizona, recently examined the McCracken mine with a view of taking over the property for large interests, and equipping it with modern operating and reduction machinery.

With the general arrangements coincident with the organization of the recently incorporated \$10,000,000 Wyoming Refining Co., at Casper, satisfactorily disposed of, the officials of the new concern are busy with pipe-line and refinery construction plans.

The West End Chemical Company, owner of the greatest known deposit of Colemanite or borax ore located near Las Vegas, will soon begin work on a big mill. This will, it is understood, be located on the railroad near Dyke siding. It is stated that the new plant when completed will give employment to approximately 200 men. It will be a very substantial addition to the payrolls tributary to Las Vegas, Nevada.

Henry I. Moore, vice-president of the Nevada Douglass Consolidated Copper Co. of Ludwig, Mason Valley, motored into Tonopah recently from Salt Lake City, accompanied by Ed L. Lowell, J. O'Connor, E. W. Logsdon and A. D. Morrill. The party was en route to Ludwig to make a survey of conditions at the mine. The Nevada Douglass has a large tonnage of copper sulphide ore in its mines and plans to build a flotation mill.

Two farmers met after church as usual and had this conversation:

"Sold your pig?"

"Yes."

"What'd ye git?"

"Thirteen dollars."

"What'd it cost to raise it?"

"Paid \$3 for the shoat, \$5 for the lumber in the pen and house and \$5 more for the feed."

"Didn't make much, did ye?"

"No, but I had the use of the pig all summer."

Petroleum Notes

The Southern Utah Oil Company spudded in its first well in the Uinta Basin country six miles south of Duchesne on the 15th. A standard rig is being employed and it is reported that good headway is being made.

The Deseret Oil & Refining Co., of Salt Lake, has been granted permission by the State Securities Commission to sell 100,000 shares of stock at par, \$1 a share. The company owns 6,000 acres of well located land in the Fossil, Wyoming, field, near Kemmerer.

Charles Nelson is preparing to load at Sage and remove to Granger the complete standard well drilling outfit which has for the past year stood idle on the site where the Bear River Oil & Development Co. drilled several hundred feet nearly two years ago, about 12 miles from Sage.—Kemmerer Republican.

Pipe line runs at Cat Creek, Montana, in the first week in December dropped to 3,300 bbls. a day from an average of 4,400 bbls. daily for the last week in November. Beyond routine operations, the field has had but little of interest to report since the completion of the big well east of the Mussellshell several weeks ago.

At a meeting of the directors of Consolidated Royalty Oil Company, held Thursday, December 15, at Casper, Wyoming, the regular quarterly dividend of 3 per cent was declared, payable on Jan. 20, 1922, to stock of record Jan. 15, 1922. This will be the seventeenth consecutive quarterly dividend paid by the Consolidated Royalty Oil Company.

Effective Monday morning, Dec. 5, the Midwest Refining Co. started taking 100 per cent of the production from the wells in the north half of the Salt Creek field, and 50 per cent from the wells in the south half of the field. The runs for the day totaled about 41,000 bbls. This quantity was gradually increased until the average of the runs for the entire week were somewhere around 43,000 bbls.

After drilling five dry wells in a courageous effort to locate an elusive sand that he felt sure must be somewhere in the neighborhood, Harry Hazlett, of Independence, Kan., received his reward very recently when he drilled into 30 feet of sand at a depth of 780 feet on the J. D. Hester farm, five miles northeast of Colony and developed a well which experts say will not fall short of 150 barrels flush production.

A. B. Curtis, who is in charge of drilling operations for the Wyoming-Pacific Oil Co., in the Fossil field, was in Kemmerer during the week on business. He reports that work at the well has been proceeding slowly, but steadily, and that a depth of 610 feet has been reached. From all geological indications, which were carefully checked when the well was spudded in, the oil stratum should be encountered at a depth of 720 feet.

Quite an active if not a real lively condition is being taken on at the Bair Oil Company camp these days, says the Rawlins, Wyo., Republican. The oil pipe line is being buried five feet under cover and about three thousand barrels per day is being run through it to the Fort Steele loading racks. The Utah Oil & Refining Co. recently contracted for the entire product of the company at \$1.60 per barrel for a period up to September 1, 1922. This is ten cents above the posted price for Salt Creek crude, proving the higher intrinsic values of the Lost Soldier oil.

The recent deal between the Humphreys-Fols interests and the Prairie Oil & Gas Co. and the Sinclair Crude Oil Purchasing Co., whereby the latter two companies agree to pur-

chase crude from the first named interests to the maximum amount of 33,000,000 barrels from the Mexia field, provides for a price of \$1.50 per barrel. The total amounts to approximately \$50,000,000. The Humphries Pure Oil interests and Prairie-Sinclair interests will each take half of the field production up to 40,000 barrels a day, or 20,000 barrels. The Prairie-Sinclair Companies will each build an 8-inch pipe line from their present Texas terminals to Mexia field and are installing tankage for 5,000,000 barrels each. The Humphreys-Pure Oil interests are also building a pipe line to the coast and will construct a refinery.

The Monarch Shale Oil Co., which is operating a shale retort 13 miles north of Debeque, Colo., recently contracted for the sale of one carload of shale oil to the Silver Mines Co. of America for use in flotation work at Aspen, Colo., at \$8.40 per barrel. Smaller orders in containers have been sold to the same interests and others at \$10.50 per barrel. J. H. Ginot, of Denver, inventor of the process being used by the Monarch Co., and its president, cites the above as an answer to recent statements that oil can not be economically recovered from shale and sold in competition with well oil at the present prices of crude. He states that the oil is produced at a cost of \$1.56 per barrel and that with a pipe line constructed to the railroad the cost will be reduced to 89c per barrel. Capacity of retort in operation will permit shipment of three cars per week.

At the Boulder, Colo., field office of the Bureau of Mines, in the course of the oil shale investigations, runs have been made with a large horizontal retort in which the highest yields and the best oils thus far produced were obtained. Changes in the retort have made its control much more effective than in the past. Recent work apparently indicates that oil yielded by a horizontal retort is not of as high quality as that from retorts of the vertical type.

J. C. Donnell, president of the Ohio Oil Co., in speaking on "Reminiscences," before the American Petroleum Institute at Chicago, said that in the Rocky Mountain region 248 structures have been tested at a cost of \$83,000,000, on 41 of which oil or gas has been discovered, representing an expenditure of \$63,000,000, while 207 unsuccessful ventures entailed a net loss of \$20,000,000. These structures were all located by geologists. In speaking on the problem of maintaining production, he said: "The present daily gross production of the United States is approximately 1,300,000 barrels and by reason of raising this oil there is a drainage per year of 135,415 acres; so that there must be acquired and operated during the year 1922 a like amount of productive acreage to maintain present production, the cost of acquiring which, including royalty, drilling, lifting and wildcatting will represent a total outlay of \$948,000,000."

Continental Oil Co., the Standard Oil marketing company in the Rocky Mountain district, will establish retail filling stations in the principal Wyoming towns and retail gasoline at a price averaging around 2c per gallon over the tank wagon price, according to an announcement given out by Governor Carley of Wyoming, following a conference with E. T. Wilson, president of the Continental. Wilson was quoted as saying that prices charged Wyoming consumers were not based on Tulsa or Whiting prices, but on quotations at Casper plus freight and other charges and that by establishing the retail stations which will sell on a margin of 2c, prices would be held down to a reasonable figure as had occurred in Colorado and other states where it operates stations. This statement brought protests from a number of retailers who claim that they have only charged 2c margin, and that the entrance of the Continental into the retail trade will result only in sending more

Wyoming money to 26 Broadway. Heretofore Continental has confined its efforts in Wyoming to wholesaling gasoline.—Wyoming Oil News.

A most important test, and one which will be closely watched by the oil fraternity of the territory, will be spudded in within the next few days on the northeast quarter of section 2-24-84, Pine mountain, on leases of the Evans Oil corporation of Casper, Wyo., which controls 2,400 acres in that field. The hole will be drilled by the California Oil company on an operating agreement. A standard rig has been erected, all tools and equipment, including casing, are on the ground, a gas line has been laid for fuel purposes and everything in readiness for spudding in with a twenty-inch hole which can be carried to any depth necessary. The field has been proven for both oil and gas by another company, the oil having been used extensively as a lubricant in its natural state, and bringing the highest price per barrel of any oil yet discovered in the mountain states.

U. OF U. COURSE IN CIVIL MINING

With the return of Professor Robert S. Lewis from a year's leave of absence for the purpose of further study of the coal mining industry, the University of Utah will be prepared to give a thorough course in coal mining, starting with the winter school quarter which opens January 3. Although Utah is the leading state both in quality and extent of coal in the Rocky Mountain and Pacific Coast districts, this is the first time such a course has been offered at the University.

"During the war," said Dr. Joseph F. Merrill, director of the School of Mines and Engineering of the University, "there was no time that we could not have placed at least ten or a dozen senior students in coal mining positions."

By the quarter system, as is now in use at the University, students may enter the school and register for new courses at the first of any school quarter. The winter quarter will last from January 3 to March 18.

TO FINANCE SALINA COAL CO.

On an amended application by the Salina Coal company, the state utilities commission grants this concern authority to dispose of \$450,000 worth of additional bonds to George L. Derr, broker and bond dealer of Los Angeles, Cal. Under the agreement whereby authority for the sale of the bonds is granted by the commission, the net amount of the bonds, \$395,000, shall be deposited with the Columbia Trust Company as trustee, and no part thereof shall be withdrawn until the underwriter shall have secured the entire amount. Should the underwriter fail to place the entire issue within a year, the trustee shall repay to any bondholder the net amount paid into the bank on the purchase of bonds.

The proceeds of the bond issue are to be devoted to develop the company's extensive and valuable coal mining properties in Salina Canyon, Utah. Officers are J. O. Ryan, president; R. M. Lehman, vice president; L. E. Cluff, secretary, and R. M. Lehman, treasurer.

UTAH APEX WINS BIG JUDGMENT

The Utah Apex Mining Company is awarded judgment of \$1,154,928.98 for ore extracted from its mining property by the Utah Consolidated Mining Company in a decision handed down on the 15th instant in the United States district court by Judge Tillman D. Johnson. The decision followed a conference between the court and attorneys for the plaintiff and defendant at which differences in the accounting of the two companies amounting to more than \$100,000, were considered.

A total of \$948,340.99 is allowed for the ore extracted from the Apex concern's property, and the interest amounts to \$206,587.99, bringing the total to \$1,154,928.98. The court permitted the Utah Consolidated Mining Company to deduct from its accounting the amount expended for improvements and work on the property. The defendant is given thirty days to appeal.

The property in question was decreed by the court as belonging to the Utah Apex Mining Company, following a hearing which began in November, 1919. The litigation involves the Apex rights to ores discovered by the Apex company within its Highland Boy claim. The property was mined by both companies for two years prior to the time the proceedings were instituted.

After a decision had been rendered in favor of the plaintiff, both parties were instructed to file an accounting of the ore extracted from the claim. The first accounting differed to the extent of more than \$500,000, the Utah Consolidated Mining Company presenting an estimate of \$570,000 and the Utah Apex Mining Company an estimated total of more than \$1,000,000. A hearing was held on the matter of the accounting and the court instructed the parties to make a second accounting and to observe closely the rules laid down by the court in regard to that matter.

In its second accounting the defendant admitted an error in its first estimates. The new total was fixed at \$1,070,000. The plaintiff, in its accounting, placed the total at \$1,171,000.

FAMOUS OLD BAYHORSE MINE COMES BACK

The U. S. Metals Company, a Spokane, Wash., corporation, is developing one of the most promising silver mines in the west. The property is on the Snake river, eight miles north of Huntington, and near the track of the Homestead branch of the Oregon Short Line.

This property is the famous old Bayhorse mine, which was operated extensively 40 years ago when high grade ore, taken from a chamber near the surface, was packed out on the old Oregon trail and shipped to Swansea, Wales, for smelting.

After the mine had been unworked for 28 years P. H. Miller, an operator in the Seven Devils mining district in Idaho, secured a lease and bond on it in 1919. He found the old workings, which were caved in, and has taken out considerable good milling ore. Recently the property passed into the hands of Spokane and North Idaho interests and plans are now under way for extensive development. A sidetrack is to be built and a surface tramway will connect the mine with the track and when these are completed shipments of ore to the Tacoma smelter will be inaugurated. Eight to ten cars of ore are on the dump and ready for shipment. The development work consists of a 375-foot tunnel in which are several stopes, which show veins from nine to 20 feet in width which assay records at the mine show carry from 86 to 132 ounces of silver.

The ore is a blue-gray porphyry with disseminated argentite similar to that which carried the chief values in the old DeLamar and Trade Dollar mines in the Silver City district. Layers of talc throughout the tunnel indicate a strong vein. At points where the talc joins the veins it carries good values. The formation indicates a well defined mineralized porphyry dyke, which should mean a massive ore body. The veins in the district run northeast by southwest, with a dip to the north of about 65 degrees. In the face of the tunnel, where work is now being done, is a handsome vein of silver ore about 40 feet in width.

A letter from the folks down on the farm says pa hasn't had much sleep for three nights, on account of sitting up with a sick Ford.

WATER LEVEL IS RECEDING IN DEEP TINTIC DISTRICT MINES

Water in two well-known and productive Eureka properties, the Gemini and the Ridge and Valley, is receding, according to Manager Jackson McChrystal. Measurements taken by Mr. McChrystal showed that in what is known as the "72" winze the water was fully twenty-five feet below the normal water level, which is approximately 1,650 feet below the surface.

In the Ridge and Valley, worked through the Gemini shaft, the water, which has receded approximately fifteen feet, still appears to be receding, according to the most recent report from the mine. Mr. McChrystal is at a loss to account for the lowering of the water level. Some mining men advanced the theory that the falling of the water level may be due to pumping operations being carried on in the Chief Consolidated mine.

It is believed by the management that, by using the company's present pumping equipment, it may be possible to lower the water still further in important sections of the two mines.

Under Mr. McChrystal's plan, the water will be pumped into open fissures at some distance from the place where mining operations are being carried on, rather than to lift the water clear to the level. If further unwatering of the mines is possible, leasing operations will unquestionably be stimulated, and the revenues of both companies increased.

When the Gemini company was operating its pumping plant, it is understood that in workings reached from the "72" winze some exceptionally rich silver ore was mined. It is stated that a considerable amount of this ore was exposed at the time the company stopped pumping because of the heavy expense and mechanical troubles experienced.

ANACONDA'S CONTROL OF AMERICAN BRASS

Acquisition of control of the American Brass Company by the Anaconda Mining Company is considered by Montana mining men as the most important development of recent years as regards the mineral producing industry of the state. In confirming the press report of negotiations, John Gillie, general manager of the mines of the Anaconda company, according to advices from Butte, made the following comment:

"The American Brass Company is the largest concern of its kind in the world. In normal times, it uses in its manufacturing plants more than 450,000,000 pounds of copper per annum and 150,000,000 pounds of zinc. The production of copper in the Butte district in normal times is approximately 275,000,000 pounds, although we have produced, under extraordinary demands, more than 300,000,000 pounds. As a result of this acquisition, it can be said that with any reasonable basis of business conditions the mines of the Anaconda Copper Mining Company should never be shut down. It is a practical assurance of continued operations and is the best news for Butte, Anaconda and, indeed, for all Montana that has developed practically in the history of the Anaconda company."

HEAVY ANCIENT FORESTS IN DAKOTA

Fossils have been aptly called the illustrations in the great book recording the world's history, the pages of which are the layers of rock that form the outer part of the crust of the earth. By looking at some of the photographic reproductions of fossil plants we can restore in imagination the ancient vegetation of parts of the world.

Fossil plants are very abundant in the Fort Union formation, a series of Tertiary rock beds in North Dakota, where

they are found in the sandstone, in the harder concretions or lenses, and in the clay between the beds of sandstone. Most of them especially those in the clay, are preserved with remarkable fidelity. About 300 species of plants from this formation have been described, and the total number of species it contains may perhaps reach 500 or more, according to the United States Geological Survey.

This abundant fossil flora shows that what is now an almost treeless plain was once covered with splendid forests of hardwoods, interspersed with scattered conifers and ginkgos. The presence of numerous and at many places thick beds of lignite make it clear that in this region there were great swamps, which must have existed with but little change for long periods of time. Among the plants of this epoch were fig trees and a fan palm with leaves 5 or 6 feet across, indicating that the climate was as warm or warmer than that now prevailing on the South Atlantic slope of the United States.

SILVER PARK MINES TO BE WORKED

Eastern and local interests have recently taken over a number of the more valuable properties in the Silver Park district, situated about 45 miles in a northerly direction from Pioche, Nevada, and about one mile from the Atlanta gold mine, which has a proven tonnage of 100,000 tons averaging \$9 in gold and silver. It is not planned to push the development of the Silver Park mines until spring, although a force of men will be employed throughout the winter months.

The mines recently taken over include the Nevada Park, The Miner's Delight, The Great Eastern and the Conway and Bradshaw properties, covering the cream of the mineral area. Besides these patented mines, the Fan Tan group of four claims has been acquired, giving sufficient territory for future extensive mining operations.

All these properties have been producers during the past few years, and only the low price of silver and the excessive cost of transportation, which has rendered unprofitable the mining of ore, except such as is of bonanza grade, has held back the development of this interesting district which has been favorably reported on by a number of prominent mining engineers.

Shipments made during the year 1913 demonstrate that high grade ore still exists in the mines in quantity. A lot of selected ore, billed to the Garfield plant of the American Smelting & Refining Company assayed, according to the settlement sheet, as follows: gold: \$1.60 per ton, silver 223.05 ounces, the iron content being 2.5 per cent. Another lot shipped earlier in the year to the Midvale plant of the United States Smelting Company, assayed \$1.10 in gold, 88.15 ounces in silver and 2.7 per cent in iron, the insoluble content averaging about 82.0 per cent.

Preeminently a silver producing area, Silver Park has had an interesting history and such history is replete with strikes of silver ore of great richness. Even in later years lessors shipped a car of ore from the Nevada Park Mine that netted them over \$7,000 and a small consignment of selected ore, carefully guarded in transit to market, gave such high silver results when assayed by the smelter, that settlement was withheld pending further investigation and sampling and when finally paid for represented a small fortune.

With silver selling for \$1 per ounce under the Pittman act the time seems ripe for resumption of activity in the Silver Park district and with further work new bonanza ore bodies should add to the production of the district and promote renewed interest in the Atlanta section contiguous to Silver Park.

MUCKING MACHINE SPEEDS LONG DRIFT

The Hecla Mining Company is making a record run on the Star drift to connect the Hecla workings at Burke with the Star mine at Mullan, Idaho, a total distance of two miles as the drift is being run, according to reports received from the mine, recently.

The drift starts from the 2000-foot level of the Hecla and is being carried eight feet wide and nine feet high. Already the work has progressed 2500 feet and is being rushed forward at the rate of 15 feet per day of 24 hours.

This great speed is made possible by the use of a new mucking machine which handles the muck on a huge shovel operated by air. The machine cleans up a five-foot round of muck while the miners are drilling over the bar, and does it neatly, leaving no muck for the miners to handle before drilling their lifters. It is the first machine of its kind to be employed successfully in the Coeur d'Alenes and greatly increases the speed and cheapens the cost of tunnel driving. Three shifts are employed in the Star drift with two machines on the bar. With the present rate of speed maintained, this long connecting drift will be completed within a year.

ICELAND SPAR IN NEVADA

Another rare and valuable mineral has been added to the long list of metals and minerals found in Nevada, and Lyon county has the distinction of having within its lines the largest body of Iceland spar ever found, according to a recent Wabuska dispatch. The discovery lies 7 miles north from Wabuska and about 3 miles east from the railroad. There are veins on the property ranging from 4 feet to 40 feet.

The whole system shows crystallization and on the hangingwall there occurs from 2 to 3 feet of large crystals. As is usual the crystals are discolored at the surface, but at 10 feet depth they are quite clear. There are 3 full claims on all of which the spar outcrops quite prominently.

Iceland spar is used in the manufacture of optical instruments such as microscopes, saccharimeters, colorimeters, photometers and in the manufacture of high grade glass.

The best grade of optical spar sells at from \$10 to \$20 per pound. Specimen material commands a price of \$1.50 to \$2 per pound, and standardization spar about \$1 to \$2 per pound.

Preparation is being made to open up the veins by sinking several shafts and by drifts and crosscuts. When you realize that all of the material has a value and demand and is so near the railroad, the importance of this discovery becomes apparent. The deposit was discovered and located by J. P. Smith of Wabuska.

STOCK EXCHANGE "SEATS" SELL AT \$95,000

Three memberships in the New York Stock Exchange have been sold this week for \$95,000 each, a price which is \$5,000 above the previous sale, \$90,000.

The \$95,000 price is \$15,000 below the highest figure ever paid for a "seat" in this exchange.—New York Curb.

George Graham Rice has turned up at Rocky Bar, Idaho, where he is reported to have interested New York capital in an option on a local property. The *Police Gazette* please copy.—Engineering and Mining Journal.

Mike—Pat, did yez hear about the Irish Free State? Pat—Ye Jazus, I did; and hell with be poppin' now.

NEW BOOKS RECEIVED

THE ECONOMICS OF PETROLEUM, by Joseph E. Pogue, Consulting Engineer, co-author of "America's Power Resources;" "The Energy Resources of the United States;" "Prices of Petroleum and its Products During the War," etc. Wiley & Sons, Inc., New York, 375 pages, 6x9 inches; 151 figures, over 100 tables. Price \$6. For sale by the Salt Lake Mining Review.

This book comprehends a complete survey of the petroleum industry. It is altogether impractical to even outline the world of valuable, up-to-date information which the volume contains. This work will appeal to every man who is in any way concerned in the petroleum industry. It discusses the economic aspects of every phase of the industry, including oil production, transportation, refining, marketing and utilization. Executives, salesmen of oil stocks, investors, promoters, etc., will find this book packed with just the information they need every day. The book includes a large number of charts carefully prepared and which graphically illustrate the facts compiled and presented in the text. Thirty or more subjects are covered in the table of contents, so that it is easy to find the information sought on any particular phase of the industry which it illuminates and brings so comprehensively before the reader. If you are in any way identified with the oil industry, or you are interested in posting yourself concerning its intricacies and magnitude, there is nothing in print which can be consulted with as much satisfaction as may be obtained in the perusal and study of this work. It is only just off the press.

GENERAL MANAGER OF U. S. SMELTING RETIRES

Clarence E. Allen will retire January 1 as general manager of the intermountain department of the United States Smelting, Refining and Mining Company and will be succeeded by E. D. Muir, now manager of the mines department. Mr. Allen tendered his resignation several months ago, but was induced to remain with the company until the end of the year.

Mr. Allen has been connected with the mining industry of Utah for forty years. Mr. Muir has been with the U. S. Smelting company for eleven years.

The Bartlesville Zinc Company, at Bartlesville, Oklahoma, has announced the immediate reopening of its zinc smelters that have been closed since spring. According to reports 700 men will be employed. The company owns three plants containing in all about 1,800 retorts.

December estimated, the receipts at the Boise assay office for the calendar year of 1921 will run to 1,155 fine ounces of gold valued at \$23,915.94 from Idaho. From Oregon the receipts should run to 3,282 fine ounces valued at \$67,856.49. The silver from Idaho will reach a value of \$1,877,210. The bullion goes from this office to San Francisco.

The Engle copper mine at Englemine, Plumas county, Calif., is producing one million pounds of copper a month at its Superior mill, according to a statement credited to William R. Lindsay, general superintendent. It is the only copper mine of consequence operating in the west. The company is said to have a favorable contract for the marketing of its copper.

WANTED—Job by man and wife in mining camp. Wife to cook for men; man to work at mine. Address: H. E. Wagner, No. 7 So. Fourth East St., Salt Lake City, Utah.

SALT LAKE MINING STOCK QUOTATIONS

The range of the market from December 10th, 1921, to December 24th, inclusive. Quotations furnished by J. A. Hogle & Co., direct wires to all leading markets, 169 So. Main St., Salt Lake City, Utah, ground floor of Eccles Building, Ogden, Utah, and Pocatello, Idaho.

Stock.	Open.	High.	Low.	L. S.	CLOSING		
					Bid.	Asked.	Sales.
Alta Con. ....	.01½	.01½	.01½	.01½	.01		1,000
Alta Tiger							
Albion Cons. ....	.06½	.07½	.06	.07½	.06½	.10	7,300
Amn. C. Cop. ....						.01	
Alta Tun. ....	.11	.13½	.11	.12	.11½	.12½	19,200
Addie .....					.02½	.25	
Bullion .....	.01½	.01½	.01	.01½	.01	.05	2,000
Big C. Coal. ....	.04½	.04½	.04½	.04½	.04½	.05	2,000
Beaver Cop. ....						.01	5,000
Bay State .....	.01	.01	.01	.01			1,000
Black Metal .....					.07	.10	
Bingham Gal. ....	.04½	.04½	.01	.01	.01	.02	172,000
Cent. Eureka .....					.02		
Colb Rexall .....	.11	.12	.10½	.12	.12	.14	1,900
Colo. Con. ....	.01½	.02	.01½	.02	.02	.05	1,500
Cardiff .....					.85	.92	
Cott. King							
Daly					1.00	3.00	
Daly West					1.50	3.50	
Dragon .....					.02½		
Demij'n Con.							
Emma Silver .....	.1	.01½	.1	.01	.01	.01½	67,000
E. & B. Bell					2.25		
Emerald .....						.02	
Eureka Mns. ....	.04½	.04½	.04	.04½	.04½	.05	2,500
E. Crown Pt. ....	.02	.02	.02	.02	.02		18,500
E. Tin. Coal. ....						.01	
E. Tin. Con. ....	.06	.06	.06	.06		.10	1,000
Eureka Lily .....	.06½	.06½	.06	.06	.06	.07½	2,500
Eureka Bul. ....	.02½	.02½	.02	.02½	.02½	.02½	27,850
Grand Cent. ....	.26	.41	.26	.41	.43	.50	1,000
Hamb'g Mns.							
Howell .....	.05	.06½	.05	.05½	.05	.06½	10,200
Iron Blossom .....	.20	.44	.15	.44	.44	.45	6,469
Indian Queen .....						.01	
Iron King .....	.06½	.08	.06	.07	.08	.10	12,310
Judge M. & S.	2.70	2.70	2.50	2.50	2.00	3.00	200
Keystone .....						.50	
Kennebec .....	.05	.05	.05	.05	.05	.07	1,500
Lehi Tin. ....	.01½	.01½	.01½	.01½	.01		11,000
Leonora .....	.01½	.01½	.01½	.01½	.01½		2,000

Stock.	Open.	High.	Low.	L. S.	CLOSING		
					Bid.	Asked.	Sales.
Logger .....						.01	
Lynn B. Six .....	.07	.08	.07	.07½	.07		4,000
Monzonite .....						.02	
Mammoth .....					.10	.50	
Miller Hill .....						.02	
May Day .....					.01		
Mich. Utah .....	.10	.17	.10	.17	.16½	.17	43,679
New Quincy .....	.06	.06	.04½	.04½	.04½	.05	65,100
Naildriver .....					.05		
No. Standard .....	.03½	.04	.02½	.03½	.03½	.02½	41,077
O. K. Silver							
Opohongo .....	.1	.1	.1	.1	.1		1,000
Orig. Ban.							
Plutus .....	.12	.12	.12	.12	.10	.15	250
Prince Con. ....	.05½	.07	.05½	.07	.07	.08½	7,700
Paloma .....					.01		
Pioche Brist. ....	.1	.1	.1	.1	.1	.01	6,000
Price Mining .....	.04	.04½	.04	.04½	.04	.07	5,000
Provo .....					.01½	.02	
Rico Arg. ....						.01	
Reeds Pk. C. ....	.01	.01½	.01	.01½	.01		3,000
Rico Well							
So. Standard .....	.12	.12	.12	.12	.12		3,500
Sells .....	.02½	.03	.02½	.03	.02½	.03½	6,500
Syndicate							
Sil. King C.	2.10	2.10	2.10	2.10	2.05	2.50	800
Sil. King Con. ....	.51	.55	.50	.53	.51	.57	2,400
Swansea Con. ....					.01½	.02	
So. Hecla .....					.12½		
Silver Shield .....	.02	.02	.01	.01	.01		4,500
Tar Baby .....	.02	.02	.02	.02	.02		5,500
Tin. Standard	1.95	1.95	1.77½	1.85	1.85	1.87½	9,500
Uncle Sam .....						.01	500
Union Chief .....						.03	
Victor Con. ....						.02	
Victor Mng. ....						.02	
Whirlwind .....						.04	
West Toledo .....	.02½	.02½	.02½	.02½	.02	.04	2,500
Walker Mng.	2.70	2.70	2.70	2.70	2.65	2.75	100
Woodlawn .....	.05	.05	.05	.05	.06	.07	800
Yankee Con. ....					.01		
Zuma .....	.02½	.05	.02½	.05	.02½	.05	8,500

ORE SHIPMENTS

Ore shipments from the mines of the Tintic district during the two-week period ending on the 23d totaled 297 carloads, as follows:

Tintic Standard	91
Chief Consolidated	77
Victoria	23
Iron Blossom	21
Eagle & Blue Bell	17
Centennial-Eureka	10
Dragon Consolidated	11
Colorado Consolidated	17
Mammoth	4
Empire Mines	7
Swansea Consolidated	7
Gemini	5
Bullion-Beck	2
Alaska	1
Sunbeam	2
Gold Chain	1
Yankee Consolidated	1

Total carloads297

Park City mines for the two weeks ending on the 23d shipped a total of 4,993 tons of ore to the valley smelters, as follows:

Judge Allied Companies	2,580
Ontario Silver Mines	884
Silver King Coalition	1,529

Total tons4,993

METAL MARKET QUOTATIONS, DECEMBER 24TH

Silver .....	.99¼c.
Silver, in London .....	.35¾c.
Copper .....	.13¾ @ .14c.
Lead (New York)	\$.470 @ \$.480
Zinc (East St. Louis)	\$.490 @ \$.495

EASTERN STOCK QUOTATIONS DECEMBER 24

Bingham Mines	12¾ @ 13
Butte and Superior .....	.19¾
Chino	27½ @ 28
Chief Con.	3 @ 3¼
Daly West	1¾ @ 3¼
Eagle and Blue Bell	2¼ @ 3
Mason Valley	1½ @ 2
Itay Con.	15 @ 15½
Utah Apex	2¾ @ 3
Utah Con.	1 @ 1¼
Utah Copper .....	.63 @ .63¾

ASSESSMENTS PENDING

Imperial Lead Mining Co., 1c. a share. Delinquent December 30.
Sale day January 20.
Mutual Metal Mines Co., ½c. a share. Delinquent January 7.
Sale day January 30.
Tintic Paymaster Mining Co., 1c. a share. Delinquent January 9.
Sale day February 8th.

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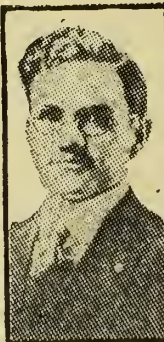
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The Salt Lake Mining Review

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SALT LAKE CITY, UTAH, JANUARY, 15 1922

SINGLE COPIES, 15 CENT

The Great Camp of Park City; Its Solid Stability and Rosy Future.

By L. E. Camomile.

The old year closed and the new year opens auspiciously for the noted silver-lead camp of Park City. It can be truthfully said of Park City that for fifty years of its mining activity it has never been in the "down-and-out" classification, so it has never experienced or staged a "come-back." Whenever the roll is called this old stand-by district invariably answers "present." Through periods of depression in metal markets, inimical legislation and all the other numerous afflictions that have affected the metal mining industry Park City has managed to keep its mines open and its community intact. Go back over the records of mining and mining camps since the palmy days of the Comstock and you will find that Park City's claim to eminence and stability has rested on a firm foundation; that, weighed in the balance, it has never been found wanting.

Park City has enjoyed periods of boom activity, but "wild excitement" has ever been a stranger in the camp. It has felt the stimulus of new mine discoveries and development and for most part, since the earliest days, has taken them as a matter of course. Maybe that is one of the chief reasons why it has escaped the pit-falls of disaster into which so many mining camps of great promise have been swept in the past. Park City, like Butte and Bingham and Tintic, is a camp in which they do things—and do it right in the light of legitimate mining practice. Bombastic, unconscionable fake mining promoters have never found the Park City district a very remunerative field in which to ply their calling. As in every other mining camp—and as in every other field of legitimate enterprise—Park City has had its mining company failures; but it can be said to the everlasting credit of the district that few promotions were ever launched there that were conceived in fraud—and that, be it said, is SOME record.

Gigantic Merger of Big Mines Being Consummated

The most gigantic merger or consolidation of properties that Park City has ever known is being consummated as this is written. It involves a stretch of country right through the heart of the Park City district and, according to the best information obtainable at the moment, includes the holdings of the Park-Utah, the Daly, the Daly-West, the Little Bell and the mammoth acreage of the Daly-Judge estate, proper. While all of these properties have been operating under the expressed title of the "Judge Allied Companies" for a year or more past, they have retained their individual identities. Details, the Mining Review now is advised from what is considered reliable, though unofficial, sources, are being consummated in New York, and official announcement of the completion of the deal should shortly be made. The stretch of terri-

tory embraced in this merger is approximately five miles in length and, roughly estimated, 3,000 to 4,000 feet in width. It begins with the Park-Utah property, adjoining the Ontario on the east side. It skips the Ontario and then runs westerly in an unbroken stretch, through the Daly, Little Bell, Daly West and Daly-Judge through to Brighton, at the head of Big Cottonwood canyon. What the name of the consolidated company is to be, what capitalization will be named and other details pertaining to the rounding out of the proposition, must await the formal announcement.

Camp's Immediate Feature of Interest.

At this time the keenest interest is centered in the most easterly portion of the district as a result of disclosures made in the properties of the Park-Utah company. Following a period of development that was more or less interfered with under war conditions, it is reported that great bodies of high-grade silver-lead ore have been opened up in the Hawkeye-McHenry group, which is a portion of the company's large holdings. During the last half of the year shipments of ore taken out in regular development work are understood to have resulted in the accumulation of a most comfortable cash reserve—a reserve that justified the payment of a \$50,000 dividend for Christmas.

The disclosures made by the Park-Utah have also resulted during the closing months of 1921 in a great many new locations being made in the eastern portion of the district and preparations by a number of companies, which already have done much work in that section, to redouble their efforts during this year. It is confidently believed, now that the Park-Utah has shattered the prevalent idea that the Ontario marked the limits of the pay-ore zone of the camp, that a number of other producers will be added during the year and that "the east side" will yet prove to be as valuable as the region to the west, and in which all of the rich mines to-date have been developed—and which have yielded more than \$40,000,000 in dividends, with probably as much more to come.

It is now reasonable to expect that the Glenallen which is filled with ore and equipped with a good mill, will be able to clear up its financial affairs and get away to a good, new start during the present year. It also may be expected that the Liberty Company, with most valuable territory in the Hawkeye-McHenry section will reach its objective during the coming twelve months. This will mean one more mine for the east side.

When the old McHenry and other early-day companies undertook to make mines in the section now attracting so

much attention, water was encountered at comparatively shallow depths and while ore was discovered in a number of these properties—some of it very rich ore—it was found to be up-hill and exceedingly expensive work to make producing, paying, mines there. Following the completion of the three-mile drain tunnel by the Ontario company, this eastern region was gradually drained to a depth—at the Ontario mine—of 1,500 feet. This condition makes it possible to thoroughly prospect and open up ground which, in the early days, had to be abandoned. Money for development and operating purposes now will be easily obtainable and the “east side” of the district is expected to enjoy and profit from a typical Park City “boom.”

Future of Entire Camp Looks Rosy.

No attempt is to be made in this short recital at describing in detail conditions and activities at the numerous properties now operating in the districts surrounding Park City. Every reader of the Mining Review is more or less familiar with what has been done during the past year at the Ontario, the Daly, the Daly West, Silver King Coalition, Silver King Consolidated, Three Kings, New Quincy, Daly-Judge, Naildriver and other actively operated properties. War taxes, excess profit taxes, high material, freight and smelting costs, etc., have all had a bearing on the situation, and have had much to do with reducing output of developed mines and curtailing sources of revenue for development purposes.

However, the camp has waded through the period of depression and now is emerging in such condition that that a few months to a year of less trying times should bring the camp back to a period of normal production and earnings. At the same time partially developed mines should become productive and add their quotas to the wealth-producing possibilities of the district.

The Silver King Coalition company's new 450-ton milling plant will be ready to go into commission within a short time.

With a sustained market for zinc the mill and electro-litic smelting plant of Judge companies should be operating full-tilt.

In a few months the Silver King Consolidated's development work should reach a stage that will insure steady production and the recommissioning of its milling plant.

At the Ontario, where new developments are said to be of a most assuring character in older portions of the mine, and where virgin territory now is being explored, substantial results are anticipated.

Substantial news from the Three Kings, the Naildriver, the New Quincy, American Flag and other properties are promised as the weeks go by and, with the camp free of the I. W. W. element for “good and keeps,” there are no dark clouds hovering over the camp at the present time.

Recorded Production of the Mines.

Compared with the previous year the recorded production of Park City's mines shows a falling off amounting to 18,773 tons. In 1920 the output totaled 102,187 tons, this including 2,323 tons of spelter from the Judge electro-litic smelter, which did not operate during the past year. The contributors and the tonnage shipped by each during 1921 was as follows:

Judge Allied Companies, including Park-Utah.....	37,666
Ontario Silver Mines	18,092
Naildriver	1,005
New Quincy	95
Silver King Coalition Mines.....	26,556
Total tons	83,414

The future of Park City and its mines looks rosy, indeed.

Dividend Record of Utah Mines.

In the compilation of the accompanying dividend table no attempt has been made to take up individual records farther back than 1920, with 3 exceptions. These exceptions were made because of the possibility that these companies may figure in the dividend disbursements of 1922 and because, should that happen, it will be of interest to know what such companies had previously paid. Of course, there are a number of operating companies in Utah not given mention in this table which possibly may re-enter the dividend-paying ranks, while some new ones may also be added.

The outstanding feature of the record for the past year was the entry into the dividend list of the Park-Utah company, which has the distinction of being the first to develop a “bread-earner” in that portion of the Park City district lying to the east of the famous old Ontario Silver mines.

The Deer Trail Mining Company, a close corporation operating a gold-silver property in the Marysvale district, has built a new mill, opened up sensationally high grade gold ore and paid a dividend of \$88,860. This proposition is controlled by the O. J. Salisbury estate interests and now is said to be producing at the rate of \$2,000 a day and better.

During the year the Utah Copper Company, with its disbursement of more than \$4,000,000 saved the appearance of things mightily, its disbursements totaling over four times as much as all of the other contributors; but Utah Copper lays no claim to having earned its dividends during the year, as its properties were closed down early in the spring. Its disbursements were made from surplus, which still is large enough to repeat for several years to come, even though its mines should remain closed—which, of course, they are not going to do.

Under the conditions which have prevailed it is remarkable that the Silver King Coalition, the Chief Consolidated and the Tintic Standard should have made the showing which they have done.

As a matter of fact, when conditions surrounding practically every other Western industry are taken into consideration, the mining industry, hard hit though it has been, has nothing to be ashamed of. It is perfectly safe to predict that Utah's mine dividend record for 1922 will look much healthier than the exhibit for 1921 indicates, and which is as follows:

COMPANY	Paid in 1920	Paid in 1921	Total to date
Cardiff Mining Co.	\$ 75,000.00	\$	\$ 875,000.00
Chief Consolidated	353,692.80	176,805.40	2,048,323.07
Daly Mining & S.	45,000.00	.....	3,172,000.00
Daly West Mining Co. ..	225,000.00	.....	6,831,000.00
Deer Trail .....	.....	.....	88,860.00
Dragon Consolidated	37,500.00	.....	206,250.00
Eagle & Blue Bell.....	223,286.50	44,657.30	1,607,662.80
Eureka Hill .....	.....	10,000.00	2,010,000.00
Gemini Mining Co. ....	.....	.....	2,410,000.00
Gold Chain .....	.....	10,000.00	140,000.00
Grand Central	41,666.80	15,000.00	1,895,000.00
Iron Blossom	50,000.00	50,000.00	3,300,000.00
Judge M. & S.	180,000.00	.....	2,550,000.00
Park-Utah Mining Co. ....	.....	50,000.00	50,000.00
Silver King Coalition....	.....	*364,830.00	15,563,390.00
Silver King Cons'd .....	.....	.....	1,556,696.00
South Hecla Mines .....	.....	.....	79,900.00
Tintic Standard	469,880.00	176,207.85	1,597,067.00
Utah Apex	150,000.00	.....	1,275,000.00
Utah Copper	9,746,940.00	4,061,225.00	115,570,887.50

*One half of this amount was posted in December and paid January 2d.

RECORD FOR FIVE YEARS

Total Dividends paid in 1917.....	\$ 29,339,451.00
Total dividends paid in 1918.....	19,511,744.98
Total dividends paid in 1919.....	11,225,763.00
Total dividends paid in 1920.....	11,597,966.10
Total dividends paid in 1921.....	5,077,928.25
Grand total of Utah mine dividends to date.....	\$229,363,793.35

Boom Year for the Cottonwoods Indicated by New Disclosures.

General results of properties in the Alta-Cottonwoods district during the past year have been of a character that encourages expectation that the coming season will be a profitable one to quite a number of operating companies. By the more enthusiastic element interested in the district the prediction is freely expressed that boom days are ahead—and not without considerable justification.

Discoveries of new and important ore bodies and the rounding out of extensive holdings by some of the corporations have had the effect of restoring confidence and creating a feeling that the district—or rather the contiguous districts—are primed to make a better showing during 1922 than for many years past. *

These districts—Big Cottonwood, Little Cottonwood and American Fork—are now covered with a mantle of snow about five feet deep on the level, and the probabilities are that during the coming sixty days this amount will be largely added to. Under such conditions it is not reasonable to expect that ore shipments will be increased to any appreciable extent. In the meantime, however, development will go right ahead, as provisions are always made in advance to keep things moving during what may be termed the "closed season."

Probably the most attractive feature of the past year's development was the opening up, last fall, of large ore bodies in the property of the Alta Tunnel & Transportation Company. During the closing months of the past year this company produced and marketed over \$40,000 worth of silver-lead ore which netted approximately \$42 a ton. This ore was produced from a single raise into the ore-body from the tunnel level and from a bedding the extent of which is still undetermined. A second and third raise are now being made into this same deposit, and covering a lateral distance of several hundred feet, with assurance at this writing that disclosures in the first raise will be at least duplicated. Development and ore shipments will not be carried on extensively probably before the opening of spring; but the assurance of engineers, geologists and district experts all agree that the mine has a brilliant future and that the great ore beddings will yield fortunes. The management of the property is in competent hands and the shareholders of the company, who have backed their faith in the ground and management are now looking forward to their well-earned reward.

Seemingly of quite as much importance are developments at the Michigan-Utah properties which now embrace an acreage that is large in extent and which covers much of the same mineralized zone that is making a big mine of the Alta Tunnel possessions. As a matter of current report, the Michigan-Utah has been opening up the extension of the same mineral deposits that has brought the neighboring Alta Tunnel ground into such prominence during the past few months. Also it is reported that Michigan-Utah has recently opened up fine bodies of commercial ore at depth in the old workings of the property. This suggests another great mine is to be opened up and converted into a dividend-payer in the near future—and this after years of struggle and effort that proved a constant strain on the pocketbooks of the shareholders.

Very recently there has been a big merger in the Alta camp which takes in a number of individual mines in the heart of the Little Cottonwood district. These properties are now known as the holdings of the South Hecla Mines Company. Important deep development work now is progressing at these properties and, while substantial results have been obtained in a number of them in years gone by,

and while much ore has been shipped and some dividends paid, it has only been within the last few months that mergers and consolidations were effected that paved the way for doing things on an extensive scale through the elimination of dangers of conflict and the trimming of fixed overhead expenses. As it now is a vast acreage is available for extensive exploration and economical mining and results entirely out of the ordinary are predicted for the year now beginning.

Also it is reported that the Wasatch Mines Company, through its deep drainage and operating tunnel, is disclosing ore bodies which, when metal prices and smelting rates are more satisfactory, can be depended upon to yield a large tonnage.

In addition to all of these there is the Columbia-Rex-all, which is said to be developing new ore bodies all the time, the Emma Silver, the Alta Consolidated, the Woodlawn, the Sells, the Kennebec, the Rettich, West Toledo, Tar Baby, Big Cottonwood Coalition, Howell, Price Mining, the Cardiff and other well known properties all in a position to either add to the output of the district or show that work will bring them into line.

South of Alta the old Pittsburg mine is being rapidly put in shape for heavy production from the American Fork canyon side of the divide and much other work in the American Fork section suggests that the entire district from Big Cottonwood to Alta and American Fork will hum with activity during the coming twelve months.

Tintic—Great Silver Camp of Utah.

By H. E. Havenor, E. M.

Tintic, the greatest silver producing camp in the United States, closed its 52nd year with a normal production of the white metal; but, however, with a slight decrease in the other metals. The notable events of the year were the expansion of the Chief Consolidated, the increased activity of the Tintic Standard, the results of development in the Victoria, the resumption of work at the Grand Central, the mining of non-metallies at the Dragon and the activities among the prospects.

During the past year the Chief Consolidated has acquired substantial interests in East Tintic. Among the properties acquired are the East Tintic Consolidated from the Knight interests, the Eureka Lily from the Snyder interests and through purchase of treasury stock in the Apex Standard, control or options for the control of the Apex Standard, Tintic Zenith and Tintic Union. At the same time the company has continued development of all its ore zones, has proceeded to patent on East and North Tintic mining claims and continued metallurgical experiments for the treatment of its lower grade ores. In addition to the above named companies which have been purchased, several other groups have been acquired in North Tintic, including the Eureka-Comstock.

Tintic Standard closed the year as the biggest shipper in the camp. In the early months of 1921 the mill at Warm Creek was put into operation, treating oxidized ores, while two new furnaces are now being installed for treatment of the sulphide ores from the lower levels of the mine. After this installation is completed, the mill will be able to treat 200 tons daily.

According to information from Eureka, the Victoria has developed the past year into one of the big mines of the

camp, a big tonnage of dry ore having been opened on the lower levels. The Eagle & Blue Bell, has also responded to development work and is said to be in better shape than for many months. Both of the properties continue to be large producers. The water is reported to be receding from the 1600 foot level of the Gemini, with the probability that mining operations may be continued at a greater depth.

The Centennial mine of the United States company has been shut down for the greater part of the year, the Eureka Mines is operating at a profit, the Colorado is again responding to the work of the leasers and yielding a profit; the Iron Blossom found new ore in what is considered to be another fissure system and is back among the dividend payers; the Mammoth has been shut down; the Grand Central, leased to Paul Hillsdale, has been started under the leasing system and is again entering the shipping list.

At the Dragon mine, shipments of iron ore have been curtailed, but Fuller's earth is now being marketed. It is claimed that this product is of superior quality and markets have been arranged for a large output.

Leasers have been working during the year in the south part of the camp and a considerable tonnage has been mined from the old properties around Silver City and Diamond. Some of the ore has been shipped to the Tintic mill and some to the smelters. Some exceptionally rich ore has been taken from the Showers.

Prospecting in North Tintic has been confined to the North Beck, Tintic-Davis, and Lehi-Tintic. In East Tintic, the Apex Standard, Eureka Lily, Iron King, Zuma, Eureka Bullion, Pinion Queen and North Standard have been active. Other properties have done assessment work.

It is worthy of note that during the year, Walter Fitch, Junior, in the Water Lily shaft of the Chief Consolidated in East Tintic broke the world's record for shaft sinking, having completed 427.5 feet in 31 days. The shaft was thereafter continued to the water level, at which horizon drifting is now in progress.

The outlook for 1922 is promising. Several of the newer prospects have indications of ore and are prospecting under favorable conditions. Operating expenses are lower and it is probable that more money will be available for development purposes.

There is a growing sentiment that the Tintic Drain Tunnel should be continued to its objective in the southern part of the district in order that neighboring properties might be drained so that development of the fissures mined above the water level might be continued at greater depths.

EUREKA-NEVADA CO. HOLDS MEETING

Stockholders of the Eureka-Nevada Mining Co. have elected the following board of directors: William J. Robinson, William Story, Jr., A. G. Burritt, A. W. Hyre of Lewiston, Cache county, and Alonzo Billings, Sanpete county. Articles of the constitution of the company were amended to increase the board of directors from three to five members and to change the date of annual meeting from the second Monday in July to the second Monday in January. A bond issue of \$60,000 to permit more rapid development of the property, which is situated in a very promising territory in Eureka, Nev., was voted. With each dollar taken of this bond issue, it was decided, one share of stock of the company will be given out of a fund contributed by the following: W. J. Robinson, 30,000 shares; A. G. Burritt, 17,000 shares, and W. C. Albertson, 3,000 shares.

TINTIC'S OUTPUT FOR 1921 IS LARGE.

A general feeling prevails among mining men interested in the future of the Tintic district that the year 1922 will be a more favorable period than that of the past twelve months. Reopening of the Grand Central mine under a new policy, acquisition of additional territory by the Chief Consolidated, increased activities of lessees and the hope of improved prices for metals are responsible for this optimistic outlook.

The table showing the ore shipments from the various Tintic mines for the past twelve months is as follows:

Tintic Standard	2824
Chief Cons.	1887
Dragon	568
Iron King	509
Eagle & Blue Bell.....	506
Victoria	472
Iron Blossom	453
Swansea	162
Colorado	137
Centennial Eureka	114
Gemini	90
Grand Central	86
Mammoth	71
Bullion Beck	62
Sunbeam	46
Alaska	27
Gold Chain	26
Empire Mines	22
Eureka Hill	20
Eureka Mines	17
Tintic Drain Tunnel	7
Joe Bowers	4
Yankee	4
Ridge & Valley	3
Eureka Bullion	3
Little May	3
Martha Washington	2
Silver Park	2
Showers	2
Primrose	1
Ucle Sam	1
George Castleton	1
Plutus	1
Total Carloads	8133

LARGEST TRANSFORMER ORDER EVER PLACED

Work has been started at the plant of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., on the largest single order for electrical transformers ever placed, according to announcement made by officials of that company. The order was received by the Westinghouse Electric International Company, through its Japanese agents, Takata & Company, from the Daido Denrioku K. K. (The Daido Electric Power Company of Japan.)

The contract calls for 34 transformers, averaging 9,400 kv-a each, a total of 316,400 kv-a. The transformers will be single phase, 60 cycle, oil insulated and water-cooled, and will have a high voltage of 154,000 volts, which is the highest voltage in commercial use at this time. When installed, they will weigh 50 tons each.

The Daido Denroku K. K. of Japan will install these transformers in a super-power system in the industrial district about Tokio. This super-power zone is similar to that now under consideration for the area between Boston and Washington. One of the Japanese stations, planned for Furukawabashi, will contain 18 transformers with a total output of 169,200 kv-a; another at Ohi will have nine transformers with a total output of 82,800 kv-a, and a third at Suhara will be equipped with seven transformers with a total output of 64,400-kv-a.

Eleven months will be needed to complete the record-breaking order which calls for an expenditure of approximately \$2,000,000 for the entire equipment.

WANTED—Job by man and wife in mining camp. Wife to cook for men; man to work at mine. Address: H. E. Wagner, No. 7 So. Fourth East St., Salt Lake City, Utah.

Mining Situation and Outlook in Idaho.

By Stewart Campbell.*

Since the days of the first discovery of gold in Idaho the mining industry of the state as a whole has never been more inactive than it has been during the past year, 1921. This inactivity has been largely due, as we all know, to the general depression existing throughout the world, for as 1921 was a year of liquidation, mining, as well as all other industries, had to suffer. This was particularly true of the new developments and of companies depending for finances upon the farmer, as he always has been, and presumably will be, one of the main stays of the mining industry, furnishing capital for the development of the small mines and prospects.

Not only has mining been affected by lack of finances, but it has suffered immeasurably because of the high freight rates. These and the excess profits tax constitute the dominant reasons that a large number of big producers of the state have been closed throughout the year.

Although these conditions existed during the greater part of the year, yet with general conditions approaching normal at the close of 1921 mining is coming back faster than almost any other industry. The spirit has returned, the industry as a whole is more hopeful, and new undertakings started during the past year are in a position to make a strong showing in 1922. The elimination of the excess profits tax, a readjustment of freight and treatment charges, the steady increase in the price of lead, zinc, and copper all point to an early resumption of operations by the large producers who have been idle during 1921.

Lead.

As the mining industry of other states has been similarly affected, Idaho's position as the second largest lead producing state in the Union was probably maintained during 1921, but with a production greatly under that of 1920, since the Hercules, Tamarack-Custer, Gold Hunter, and Callahan-Zinc-Lead, all large producers, have been closed throughout the year. The Bunker Hill & Sullivan, Hecla, Morning mine of the Federal M. & S. Co., and the Western Union are the principal properties of the Coeur d'Alenes that have produced continuously. The Continental mine of Boundary county, the Independence of the Federal M. & S. Co., and the Golden Glow in Blaine county, the Red Bird of Custer county, Gilmore Mining Company, Latest Out and Pittsburg-Idaho of Lemhi county have been the principal producers of lead in districts other than Shoshone county.

The outlook for the lead industry during 1922 is very favorable, as it is fully expected that the producers that have been idle will resume operations at an early date, and that a number of the new discoveries of 1921 will soon develop into substantial producers. Of these the old Chicago-Boston operated by the Galena Mining Company, the Lookout Mountain Mining Company, Pine Creek Mining Company and the Sidney of the Coeur d'Alene district all bid fair to become producers. All of these are located in a section of the Coeur d'Alenes that has been considered as unfavorable, but interest has now revived in this district, and it will mean the reopening of many properties that have been idle for a number of years.

With the advent of the Bunker Hill & Sullivan M. & C. Co., into Blaine county, the Wood River district has taken a new lease on life as this company has undertaken an extensive development campaign. With these activities

and with the Federal Mining & Smelting Company a continuous producer, the mining world is again looking toward this district. During the past year more new discoveries have been made, the section has been visited by more engineers, and more old properties have been opened up than has been the case for a long number of years. The Bunker Hill & Sullivan has acquired the Bullion, Durango, Mayflower and Jay Gould, all large producers in their day, and a number of smaller old producers adjoining them. This gives the company a substantial compact acreage in the heart of the Bullion district and a campaign has been undertaken to prove thoroughly the ground.

Bonner county has had a substantial revival in mining during the past year; a number of new discoveries have been made, and this county will probably have a substantial place in lead production for the year of 1922.

In the past Boise county has never been considered as having any possibilities in lead mining, but this idea is being disproven, and it is probable that this county will soon become one of the new lead producing districts of the state.

Silver.

As the largest part of the silver production of Idaho comes from her lead, zinc and copper ores, the production of this metal will naturally show a considerable decrease for 1921. Custer county, with the Ramshorn mine at Bayhorse and a few smaller properties, will lead the state in silver produced from a straight silver ore, while Shoshone county will still hold the first place in silver production.

The Pittman Act has greatly stimulated silver mining in production, development, and prospecting, and the coming year will see a large number of new silver producers, the principal ones being the Big Creek and Sunshine Mining Companies of the Coeur d'Alenes, the Armstead Mines of Bonner county, and a number of smaller ones in other districts. The Armstead Mines will have its new 150-ton concentrator in commission early in 1922. This company has a large tonnage of ore blocked out and when in operation will constitute a substantial addition to Idaho's mining industry. The ores of Bonner county are principally silver; and 1921 has added a number of small shippers whose activity and production will be considerably increased during the coming year, so that 1922 will no doubt gain recognition for this county as one of the substantial mineral producing counties of the state.

Washington county also shipped considerable high grade silver ore during the year and judging by the number of new companies that started operations during 1921 this county will show a considerable increase for the coming year.

Zinc.

As the properties of the Callahan Zinc-Lead Company have been closed throughout the past year, and as this company is the largest single producer of zinc in the state, Idaho's production of this metal for 1921 will probably be the smallest amount ever produced in any one year. The company, however, is contemplating an early resumption of operations. The price of zinc is on the increase and considerable activity is being shown for this metal. The Bunker Hill & Sullivan M. & C. Co., is adding a zinc unit to its smelter at Kellogg and altogether the prospects for the coming year are exceedingly bright, and zinc mining in Idaho, especially in the northern part, will probably show a complete return during 1922.

Blaine, Lemhi and Custer counties will show a small production of zinc for the past year and should show a very marked increase during 1922, as zinc is one of the principal products in the ores of the old mines that are now being

*Inspector of Mines, State of Idaho.

reopened and which are likely to be on their feet early in the year.

Copper.

The production of copper has probably suffered more than any other one metal in the state, as all of the copper producers in the Coeur d'Alene district have been closed during 1921. The Empire mine at Mackay, the largest single producer of copper in the state, was closed for the first 10 months of 1921; the Harmony Mines Company and the Pope-Shenon of Lemhi county had but a small production. Conditions affecting the copper industry are changing fast and 1922 will show a marked increase in activity and production. The Empire Mine was recently reorganized, and active production at the rate of about two cars a day was started in the closing months of 1921 and will probably continue throughout the present year. A number of producers in Lemhi and Shoshone counties are contemplating an early resumption of operations.

Considerable prospecting and development has been carried on throughout the past year, the most interesting of which is probably the Red Ledge, in Adams county. This property has been taken over by a strong company of eastern capitalists who have thoroughly prospected the ground by diamond drilling, and are engaged in further prospecting by tunneling; and, if reports issued by the company are true, their plans call for the expenditure of a number of million dollars and the establishment of another copper mine equal to that of the famous Utah Copper Company.

Gold.

The past year's record will again show Idaho lagging in her gold production, as there have been but three substantial gold producers operating throughout the year; the Yukon Gold Company at Murray, Shoshone county, operating a large dredge, the Bailey dredge at Pierce City, Clearwater county, and the Gold Hill and Iowa mine at Quartzburg, Boise county. With general conditions fast approaching normal, gold producing companies eliminated from the provisions of the income tax law and with the subsidence of the oil boom attention is again attracted to gold, and 1922 will see more new gold companies in operation and more prospecting for gold than has been the case for a number of years.

The recent discoveries of the Unity Gold Mines Company at Warren, and the operation of the new dredge now being constructed by the South Park Dredging Company at Featherville, Elmore county, should give Idaho two new large additions to the gold industry. Active construction of the South Park dredge has been started and an electric transmission power line from Mountainhome, a distance of 30 miles, is now under construction. This line will probably be extended to Rocky Bar, where a large syndicate has recently taken over a number of the old producers, and to Atlanta, where a number of new operations will be started early in the year. One dredging company and a number of mining companies in Lemhi county are contemplating an early production. The new discoveries and the big development of 1921 promise a big increase in production and an immense revival in prospecting for the new year.

Phosphate.

The U. S. Geological Survey estimates a workable area of practically 1,020,000 acres of high grade phosphate rock in Idaho and from 176,320 acres the Survey estimates 2,662,290,000 tons of high grade phosphate rock with a content of from 73 to 83 per cent tricalcium phosphate with less than 1 per cent of iron and alumina. With this immense tonnage in sight and with a number of companies

that are prepared to ship, Idaho's rock phosphate industry bids fair to become one of the principal industries of the state whenever freight and market conditions become such that production will be profitable.

During the past year the Anaconda Copper Company has been actively engaged in installing the largest phosphate producing plant in the world. This company has constructed a branch railroad from Soda Springs to its mine, a distance of 7 miles, has installed modern mining equipment of the latest type, erected ore bins of immense capacity, and is constructing the largest working tunnel in the state. All of this construction has demanded a large outlay of money, and is the largest single undertaking started in the state during the past year. The company expects to give its rock a sulphuric acid treatment that will increase the water solubility and the availability of the phosphorous which practically amounts to a concentration of three in one, thus giving a product that is marketable under the present conditions.

Antimony.

Shoshone, Valley, Blaine, Custer, Lemhi and Idaho counties, have all contributed to Idaho's production of antimony in the past, but 1921 will show such a small production of this metal that Idaho will probably lose her position of second in production in the United States. No activities have been shown so it is probably safe to assume that 1922 will not show much of a revival other than that produced with lead and zinc ores.

Tungsten.

Three active operations with tungsten as the principal metal sought started during 1921; and if the statements given out by these companies are correct 1922 should see Idaho classed as one of the tungsten producing states of the Union. This metal is widely distributed throughout the state and should eventually become one of the principal metal products.

Quicksilver.

Active prospecting, development and plant construction have taken place during the year in Idaho's quicksilver region of Valley county; and if statements given out by those interested are correct, production will be started early in 1922, thus adding a new metal to the state's varied resources, and creating an industry that will attract considerable attention.

Mica.

All of the mica producing mines in the state have been idle throughout the past year; but some of these companies expect to resume operations early in 1922; so that, with these and some of the new discoveries, particularly those of Adams county, Idaho will show a good production of this mineral in 1922.

Asbestos.

Idaho's one producing asbestos mine shipped a small amount during 1921; the coming year will show an increase; and with the attention that is being given to prospecting and the development of this mineral it is destined to become another new resource in 1922.

Monazite.

There is probably more monazite in the placer deposits of Idaho than in any other state in the Union. These are now attracting attention; a number of new companies have been formed with the intention of recovering this metal and 1922 should show a considerable production of a heretofore unthought of possibility.

Barytes.

Some of the largest deposits of barytes found in the United States are located in Blaine county. One of the deposits is under development and others are being fi-

nanced. If market, freight and price conditions justify production during the coming year this mineral will add considerably to Idaho's mineral wealth.

Limestone.

Three large limestone quarries were operated throughout the past year. The output from two of these was used in the sugar industry and the other in Portland cement. Idaho can produce an unlimited amount of limestone that will meet the requirements of the trade and considerable activity is anticipated in 1922.

Coal.

Idaho can boast of but one commercial coal mine. This mine is located in Teton county and has been idle throughout the past year. The company has been reorganized, sufficient money has been raised to equip and develop the property, and a large production during 1922 is anticipated.

A Review of Coal Mining in Utah, 1921.

By C. A. Allen, Chief State Mine Inspector

The year past was a very poor year for the coal industry in the state of Utah due entirely to the lack of market for the product. From the data submitted by the coal operators to the State Industrial Commission and the U. S. Geological Survey, the shipping mines of the state produced less than four million tons and if to this be added the production from the country banks the total will be just about four million tons. This is the smallest production since 1916 when the state produced slightly over three and one-half million tons. The tonnages for the years since 1916 are as follows:

1917	1918	1919	1920
4,125,230	5,136,825	4,631,323	6,004,788

Two new properties started production during the year, namely, the Mutual Coal Company and the MacLean mine of the Standard Coal Company, which are both in Spring Canyon district. Also the Blue Seal Coal Company did some work in the Scofield district. All of the old mines continued production, with the exception of the Utah mine of the Utah Fuel Company and the U. P. mine of the Scofield Coal Company which were operated only a part of the year.

The two largest companies in the state operated with reduced forces but some of the other mines had more men on the payroll than last year, so that the number of men actually engaged in the industry shows only a slight reduction. It is estimated that the number of men was 4363 as against 4516 in 1920, but the average number of days that the men worked was very much less than last year.

There were no labor troubles experienced and the companies continued to pay the scale of wages established in 1920. The railroads were able to furnish sufficient cars to move the coal and the falling off in production can be entirely attributed to lack of market. There were three things which contributed to the poor market, which were:

First—The general industrial depression which was common throughout the country.

Second—The unusually mild fall and early winter; and

Third—The competition from foreign coals along the Pacific coast, the Manchurian and Australian coals both having been shipped into west coast ports in larger quantities than ever before. One reason which made it possible for the foreign coals to compete with the Utah coals on the coast was the high freight rate prevailing from the Utah fields. Some reduction in this rate was secured by the

operators during the year but a still further reduction will be necessary if Utah is to hold her share of the California trade.

One encouraging condition in the operation of the coal mines was the marked reduction in the number of fatal accidents, there having been but 15 men killed as against 37 killed in 1920.

OUTPUT OF METALS FROM MINES IN UTAH, 1921

The value of the gold, silver, copper, and lead produced from mines in Utah in 1921, according to V. C. Heikes, of the United States Geological Survey, Department of the Interior, was about \$22,595,000, a decrease from \$49,744,334 in 1920. The output of all metals was decidedly less than that of 1920, and the output of copper was less than one-third that of 1920.

Gold

The mine production of gold decreased from \$2,014,556 in 1920 to about \$1,794,000 in 1921. The gold produced from copper ore was decidedly less, and the producers of siliceous ores containing gold and silver suffered from excessive costs and smelter restrictions. At Bingham and Park City the production of gold decreased slightly, but in the Tintic district the decrease was marked, as several large producers were idle for months. The United States Mining Company, at Bingham, greatly increased its output of gold from lead and copper ore, and its mine produced more than twice as much gold as any other mine in Utah. Second in gold production was the Deer Trail mine, at Marysvale, which also had a considerably increased output. Gold in quantity was also produced by the Utah Copper, Chief Consolidated, Eagle & Blue Bell, and Tintic Standard mines.

Silver

The mine output of silver decreased from 13,106,976 ounces in 1920 to about 12,366,000 ounces in 1921. The decrease in silver was especially noticeable at Bingham, Park City, and Ophir. The output from the Tintic district, however, was more than upheld, principally through the efforts of the Chief Consolidated and Tintic Standard companies. The Chief Consolidated mine, at Eureka, continued to be the largest producer of silver in the State, and the Tintic Standard followed closely. Other mines that produced more than 500,000 ounces of silver were the United States Mining Company, at Bingham; Vipont, in Box Elder County; the Judge and Ontario mines, at Park City; and the Eagle & Blue Bell, at Eureka. One of the interesting features of the year was the large production of silver ore from the Park Utah mine, east of the Ontario at Park City. The Tintic Milling Co., at Silver City continued to treat custom ores by a chloriding roast followed by leaching, and the Tintic Standard Company, in the eastern section of the district, operated its new mill using the same process. The Deer Trail mine, in Piute County, increased its production of silver, and shipments of silver concentrates from the Vipont mine, in Box Elder County, were also much greater.

Copper

The mine production of copper decreased from 116,931,238 pounds in 1920 to about 34,534,000 pounds in 1921, and the value decreased from \$21,515,348 to about \$4,354,000. The Utah Copper Company, which produces most of the copper of the State, was closed in April after producing about 25,000,000 pounds of copper during the first three months. The Utah Consolidated mine, at Bingham, was closed in March. The average price of copper was 12.61

cents a pound in 1921 and the demand for the metal was small. The United States Mining Company, Montana Bingham, and Tintic Standard produced considerable copper.

Lead

The mine output of lead decreased from 140,838,113 pounds in 1920 to about 89,782,000 pounds in 1921. The value of the output decreased from \$11,267,049 to about \$4,130,000. As the average price of lead was about 4.60 cents a pound, it was not profitable to ship lead ore unless it contained much silver. The largest producer of lead was the United States Mining Company, at Bingham, but the Utah Apex and Utah Consolidated mines were idle. The output from the Tintic, Park City, and Bingham districts was decidedly less. The closing of the lead smelter at International in July seriously affected shipments from Ophir, Park City, and Eureka.

Zinc

The mine output of recoverable zinc in 1920 was 8,157,739 pounds, but market conditions prevented shipments of zinc ore or concentrate in 1921. It was not profitable to ship zinc ore to eastern plants on account of the high freight rates and decreased price of the metal. The electrolytic plant of the Judge Mining & Smelting Company, at Park City, was closed in November, 1920, and zinc concentrates from the Judge mill were stored. Financial difficulties prevented the operation of the Utah Zinc Company's zinc oxide plant near Murray, and at Midvale zinc concentrates from Bingham ore and old tailings were stored awaiting a better market.

Ore Production

In 1921 the mines in Utah produced about 1,970,000 tons of ore, a decrease from 6,800,180 tons in 1920. Of this total the Bingham district produced about 1,485,000 tons as compared with 6,067,180 tons in 1920. The estimated production of the district was 47,052 ounces of gold, 1,059,700 ounces of silver, 28,349,000 pounds of copper, and 24,000,000 pounds of lead.

The mines of the Tintic district produced about 316,000 tons, exclusive of iron ore, as compared with 332,635 tons in 1920. The estimated production of the district was 18,578 ounces of gold, 7,425,000 ounces of silver, 1,672,000 pounds of copper, and 32,543,000 pounds of lead. The mines that produced more than 5,000 tons during the year were the Tintic Standard, Chief Consolidated, Eagle & Blue Bell, Victoria, Iron Blossom, and Dragon.

The shipments of ore and concentrates from the Park City region decreased from 88,314 tons in 1920 to about 74,320 tons in 1921. A tabulation of figures furnished by the principal shippers gave an estimated output for the district of 3,317 ounces of gold, 2,185,000 ounces of silver, 782,000 pounds of copper, and 16,425,000 pounds of lead.

The output of ore in the Ophir and Rush Valley and Big and Little Cottonwood districts was greatly reduced, but more ore was treated in Piute and Box Elder counties.

Smelter Operations

The lead smelters at Midvale and Murray were operated at a reduced rate during the year. The copper plant at Garfield curtailed its output after the closing of the Utah Copper mine but continued to receive much siliceous ore. At International the copper plant was idle and the lead plant was closed in July. In August the freight on bullion was reduced, and by December the smelters had disposed of surplus stocks and were merely shipping the current production.

The dividends paid by mining companies in Utah in

1921 will amount to approximately \$4,613,930. Dividends amounting to \$1,877,780 were also paid by the United States Smelting & Refining Company, which controls mines at Eureka and Bingham as well as mines in other states. The following companies contributed: Utah Copper, Chief Consolidated, Grand Central, Silver King Coalition, Eagle & Blue Bell, Tintic Standard, Gold Chain, Park Utah, Iron Blossom and Eureka Hill.

U. S. SMELTING PAYS DIVIDEND AND ISSUES OPERATING STATEMENT

In declaring a regular quarterly dividend of 87½ cents per share on preferred stock of the United States Smelting, Refining and Mining company, payable January 14 to stock of record January 6, directors of the corporation recently made the following statement:

"Consolidated earnings for eleven months of this year to November 30 are estimated at \$2,136,000, after providing all interest. There have been deducted from these earnings, reserves of \$979,000 for depreciation and depletion and \$104,000 for further exploration work in Mexico. These reserves aggregate in all \$1,083,000 and leave estimated net earnings for eleven months of \$1,053,000, of which \$492,000 was earned in the first eight months.

"In completing the consolidated profit and loss account for the year, these earnings will be increased by further operating profits for the year as well as profits from other sources, which, after taking care of further depletion and depreciation charges and federal taxes, it is estimated, will result in showing a deficiency for the year of from \$200,000 to \$300,000 after providing preferred dividends amounting to \$1,702,225. After charging this deficiency, the surplus will be about \$16,500,000.

"The capital additions this year will amount to about \$1,500,000 represented by construction and improvements in Mexico, additional lands and improvements at the coal properties, additions and betterments to the railroad property and mining claims and construction in Utah and elsewhere.

"Operations of the metal mines and smelters in the United States continue substantially as previously reported. The coal operations have remained very much curtailed owing to lack of demand and the output this year will be approximately 780,000 tons as against 1,548,222 tons last year.

"The Mexican properties have been working steadily throughout the year and the output will be about 870,000 tons as against last year's 996,757 tons, the decrease being due to a shortage of power during the summer months. In view of the low price for silver during the year, the profits have been very satisfactory. Properties are in excellent condition."

BURGLARS STEAL PROSPECTOR'S ORE.

Some person whom George Banovich believes must have been in distress appropriated twenty-one sacks of high grade ore from the Queen of the Hills property on Willow creek. The ore was left in the cabin at the time operations were suspended about three months ago, but Mr. Banovich was informed the other day that some one had made away with the same. It develops that a prospector from that section recently sold a ton of ore at one of the mills in Tonopah that contained values of nearly \$200 a ton, and it is suspected that he is the guilty party. —Tonopah Reporter.

OIL-SHALE INDUSTRY RECORDS SUBSTANTIAL HEADWAY DURING YEAR

By J. B. Jenson, E. M.

The year 1921 marked, perhaps, no startling achievements in the oil shale industry, but it is doubtful if any similar industry in the United States has made more real progress during the last twelve months. Retarded advancement is due, not to lack of interest in shaleology, but to the very unfavorable financial conditions pertaining to business in general.

There are a number of substantial oil-shale organizations which would have had their plants in operation ere this had business conditions warranted the undertaking. These now are planning to undertake construction work in the very near future, providing the year 1922 shows what we all expect it to—a tendency towards resumption of normal business conditions.

Although the falling of prices for underground petroleum had a depressing effect on oil drilling companies, and retarded new investment in this line, it had little or no effect on the shale land owners or shale land investors, who realize that the shale industry is one which is being established on a substantial foundation for large and long-time operations. We all realize that there will be ups and downs in the market and the investor in shale land and a shale plant is not particularly concerned as to whether the price of oil drops or rises for a few months. He knows or he has good reason to believe that with our present development of industries and transportation facilities, the output of this plant is going to be in demand at good prices for several generations to come. He is not concerned either about the uncertainty of well drilling or well production. The big underground petroleum producers are also realizing that shale oil must shortly augment and eventually supplant the present drilling field product.

The last year, more than at any other time, has seen active investigation and acquirement of acreage by oil men. By far the greatest portion of our valuable acreage has already drifted into permanent hands and will therefore not be on the market. There are still smaller tracts with here and there a large isolated tract available and these, during the coming year, will no doubt also largely drift into the hands of investors who will either hold for speculative purposes or later equip with reduction plants.

Much Land Patented and in Process

Assessment work has been done on all important claims and very little if any land of value will revert to the government. In addition to this, many owners are taking their land to patent. Reed and Doyle have secured patent on large acreages near Grand Valley, Colo., and near Watson, Utah. The Standard Shale Products Co., of San Francisco, are taking their land to patent, at Green River, Wyo., and DeBeque, Colo.

The Union Oil Co., of California, has received final register's receipt for 15,000 acres, and Ray Eaton and associates of Denver, for 5,000 acres, the Federal Shale Oil Co., for 2,000 acres, Renwick P. Ralston for 2,400 acres and R. D. Burnham for 480 acres, all on Parachute Creek near Grand Valley, Colorado.

Reuben S. Collett has received patent on Vernal No. 2 and Ashton No. 12 and has received final register's receipts on Chambers No. 8. The Utah Oil Co., has received final receipt on 1,038 acres on White River. Owen Burlingham, et. al., has received receipt for the Tocola No. 1 claim, M. E. Chew, et al., for the Denver Placer Claim No. 1 and the Watson Oil Co., for more than 7,000 acres, all of which are in the Uinta Basin, Utah.

Character of Assessment and Patent Work.

In addition to assessment and patent work done by owners in the form of open-cut, trenching and tunnel work, at least two companies have done a considerable amount of diamond drill work. These are the Ventura Consolidated Oilfields Co., who own approximately 10,000 acres of land between Brush and Clear Creeks, 20 miles north of DeBeque, and the Pure Oil Co. with extensive holdings on Battlement Mesa, near DeBeque. The Ventura Co., drilled three diamond drill holes on different horizons with an aggregate depth of 1,650 feet; the Pure Oil Co., drilled to a depth of over 500 feet. In each case a careful log of the shale measure was kept and triplicate samples and assays were made on each measure. By this means these companies have not only done work towards patent but have also secured valuable data, inasmuch as they have obtained samples free from weathering, oxidation or other alteration due to atmospheric and moisture conditions.

Commercial Retorts.

One commercial retort has been completed during the past year and test runs made. This is a rotary type of 250 tons capacity, constructed by the Index Shale Oil Co., on Mt. Blaine, near DeBeque. Minor alterations are now being made, as is customary in the installation and trying out of large mechanical equipment. It is intended to follow up this construction with a complete refinery plant during the coming summer and in the meantime, crude oil which is produced will be either stored or sold on the market.

R. S. Collett and associates have completed and made the necessary demonstration runs with a 10-ton pilot plant of the Galloupe vertical type on their shale holdings in Agency Draw near Hill Creek in the Uinta Basin. It is intended to proceed with construction of the regular plant during the next few months.

A pilot plant of the Wallace type has been completed and operated for several months, at Rosedale, New Brunswick.

The Catlin plant at Elko, Nevada, continues in operation. A considerable amount of improvements have been made and new equipment added during the past twelve months. The plant was designed to produce the maximum amount of paraffin rather than oil.

Horizontal retort with a new arrangement of shovels or agitators has been tried out by the Monarch Co., at Grand Valley, and considerable flotation oil has been produced.

The Standard Shale Products Co. has plans for a Jenson type retort to be erected this year on its DeBeque holdings.

A local organization, forming in Salt Lake, is planning to erect a Jenson shaft-type retort near Soldier Summit, Utah, which will be in operation before the year is out.

At Grand Valley, Carl C. Schuyler and associates of Denver, expect to complete their retorting plant which was commenced last year in Wheeler Gulch, near Grand Valley.

In addition to these there are quite a number of owners who will install pilot plants this year provided the financial condition in general improves sufficiently to warrant such undertaking. Work of a substantial character is being conducted in the laboratory at many points, such as at the Bureau of Mines at Boulder, Colo.; and Salt Lake City, Utah; by the Columbia University, New York; Mellon Institute, Pittsburg, and J. B. Jenson and associates at Salt Lake City.

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"FALL IN; FORWARD MARCH!"

Now is the accepted time for all of us to forget the past and turn our time and talents to building for the future. "The mill will never grind with the water that has passed." We've all been hit, and hit hard; but what is the use of repining? We are gradually emerging from the enervating atmosphere that cast a nearly impenetrable cloud over the Western mining horizon during the year just closed and the rift in this cloud is now broadening with each passing day.

In this issue of the Mining Review the accomplishments and lack of accomplishment in the mining industry during the past year is accurately portrayed. In itself the record is not inspiring; but there is the best of reason to expect that this year's showing will be such that a year hence we shall feel pardonably proud of the changes that shall have been wrought.

Every prediction for the future in this issue we believe will be fully justified. Contributions dealing with the various aspects of the mining industry are here presented by men well qualified to speak. Without exception they have avoided false pretense propaganda. They have "hewed to the line" and have elucidated the situation as it now

applies to the industry's welfare with a purpose of leaving nothing to apologize for in the months and years to come.

A gigantic revival in metal mining is shown to be at hand and the capitalist and investor will find many real pointers on how to become identified with the mining industry and make money. To those who have been weathering the storm of adversity during the past year or two, we wish to say there is much to hope for in the near future. All that now is necessary is to swing into line and join the procession.

Take the sentiments contained in the following verses home to yourself. They were promulgated by prominent New York stock and bond merchants. If you become imbued with the spirit contained in the lines you can not fail to reap your just reward:

This I would like to be—braver and bolder,
Just a bit wiser because I am older,
Just a bit kinder to those I may meet,
Just a bit manlier taking defeat;
This for the New Year my wish and my plea:
Lord, make a regular man out of me.

This I would like to be—just a bit finer,
More of a smiler and less of a whiner;
Just a bit quicker to stretch out my hand
Helping another who's struggling to stand;
This is my prayer for the New Year to be:
Lord, make a regular man out of me.

This I would like to be—just a bit fairer,
Just a bit better and just a bit squarer,
Not quite so ready to censure and blame.
Quicker to help every man in the game,
Not quite so eager men's failings to see—
Lord, make a regular man out of me.

This would I like to be—just a bit truer,
Less of the wisher and more of the doer,
Broader and bigger, more willing to give,
Living and helping my neighbor to live;
This for the New Year my prayer and my plea:
Lord, make a regular man out of me.

DEATH OF DE WITT B. LOWE

De Witt B. Lowe, well known in Utah mining and brokerage circles previous to his retirement several years ago, and who came over from Colorado to visit with his son, Irving D. Lowe during the holidays, was stricken with an accute attack of kidney trouble several days ago and was removed to St. Mark's hospital. On Monday morning last his final summons came. He was buried under the auspices of the local lodge, B. P. O. E., of which he was a member on Tuesday. Deceased was 72 years of age.

A most disconcerting and seemingly inexcusable blunder was made in the last issue of the Mining Review when, in recording the death of Charles F. Jennings, purchasing agent of the Utah Copper Co., the name was given as "Sidney J. Jennings." Mr. Sidney J. Jennings is a noted mining engineer, prominently identified with some of Utah's great mining and smelting companies, and his name slipped into the mind of the writer of the death notice as easily as a duck slips into the water. We can only ask forgiveness from all concerned.

The wage scale in the camps of Bingham and Tintic have been reduced 50 cents a day for all departments. At Bingham this reduction applies to all men receiving above \$3 a day under the old scale. Men heretofore receiving \$3 a day and less receive a cut of 40 cents a day. This action by Utah operators is in line with the action taken at Butte, and probably will result in a general trimming of the scale in practically all western mining camps.

TALWART MINING MAN CALLED BY DEATH

The state of Utah, the City of Salt Lake and the western mining, financial and business world is bereft of a staunch and patriotic citizen, exponent of industrial progress and a true disciple of moral integrity, in the death of John Dern on the 2d instant at his home in this city. He is laid to rest in Mt Olivet cemetery on the 4th, and the great concourse of people from all walks of life who paid their last respects attested the high esteem and loving friendship in which the deceased was held.

Mr. Dern was 71 years of age. He was born near Hungen, Oberhessen, Germany, and it was while he was on a visit to his native land a few months ago that he was stricken ill. As soon as he was able to travel he returned to America and stopped off at his old home town, Fremont, Nebraska, where he looked after business matters and commingled with old-time friends. Soon after arriving in Salt Lake, on Thanksgiving day, he attended a football game between the University of Utah and Agricultural college players and while there he contracted a severe cold. This aggravated his weakened condition and, although it seemed a time that he would recover his usual health, a relapse came and in spite of all that medical skill and attention could do he finally succumbed at the time stated, surrounded by his immediate family.



JOHN DERN

Surviving Mr. Dern are the following children: Mrs. Geo. Haslam, of Fremont, Nebraska; State Senator Geo. Dern; Mrs. J. C. Dick, Fred C. Dern and Mrs. E. D. Cunningham, all of Salt Lake.

How John Dern was originally induced to wean himself from farming, business and banking pursuits in Nebraska and cast his lot with the mining and kindred industries of Utah and Nevada, is a romance that would make an extended story in itself. In brief it came about when he and some of his close friends and associates in Nebraska decided to undertake the winning of gold values from the refractory mercurial ore deposits of the old camp of Mercur,

this state. It was through the investigation of Mr. Dern and his associates—all Nebraska farmers—that the application of the cyanide process to the treatment of Mercur ores was successfully worked out. It was in the start there made that Mr. Dern began his active career as a mine owner of prominence and it was from that beginning that he built up his fortune and became one of the most prominent figures in the industrial, business and mining life of Utah and the West.

As the years passed, Mr. Dern became identified with some of the most important corporate interests of not only Salt Lake but of the entire state. He was president and one of the organizers of the Gibson Commercial Company, wholesale grocers; vice president of the National Copper Bank and of the Bankers Trust Company. He was president of the Callaway, Hooch and Francis Company and a member of the board of directors of the Mason Mercantile Company of Mason, Nev. For years he had been a director of the Salt Lake Hardware Company and a director of the Highland Store Company of Bingham. His realty holdings in Salt Lake are said to be extensive and of the many interests he originally had in Nebraska, the most valuable are understood to have been retained by him until his death.

He was a director of the Dixie Power Company, a director of the Pleasant Grove Creamery Company, a heavy stockholder in the Mutual Creamery Company, vice president of the Eureka Banking Company of Eureka, and was one of the organizers of the American Mining congress, serving as president of the organization at one time.

In politics Mr. Dern was always a Democrat, having supported that party from the time he became a citizen. He had always been a potent element in the affairs of the party in Utah, although never an office seeker. He was a trustee of the Utah Agricultural college and a member of the Utah state capitol commission during the period of construction of the capitol.

SHUT DOWN AND RESUMPTION

AT BUTTE, MONTANA, EPITOMIZED

Anaconda Standard of December 30th told how it all happened as follows:

Mining and smelting operations resume Jan. 16, 1922.

Wages to be 50 cents per shift less than previous scales.

Shutdown began April 1, 1921. Approximately 6,500 men thrown out of work in Butte.

More than 1,000,000,000 pounds of surplus copper on hand April 1, 1921.

Resumption will be under curtailed production and observance of strictest economies in operation.

Co-operative effort between employer and employee absolutely essential to continued operations.

Anaconda company will produce from 6,000,000 to 7,000,000 pounds of zinc a month at Great Falls plant.

Butte & Superior plans to gradually work up to a production involving employment for 1,000 men.

Anaconda and Great Falls smelters to resume as quickly as ore is delivered.

Price of copper at lowest during shutdown 11½ cents; today, 14 cents.

Reviewing silver operations of the government, Director of the Mint Baker in his annual report says receipts of purchased silver during fiscal year 1921 exceeded any year in history of the mint, not excepting purchases under acts of Feb. 28, 1878 and July 14, 1890. The 1921 total was 66,126,511 fine ounces, most of which, or 62,880,550 ounces was Pittman Act silver at \$1 per ounce.

THE TIME TO MAKE MINING INVESTMENTS.

By Henry M. Adkinson, E. M.

The present is the critical and psychological time both for mine operators to be active in the development work in their mines which have been lying dormant, and also for mine investors to be busy in investigating properties which they may purchase. There is no disguising the fact that both 1920 and 1921 were hard years in the mining business. They were difficult years both for stockholders in the larger companies whose dividends were cut off, and for the owners of small properties which were compelled to cease operations. Everyone in the least acquainted with the details of mining knows that these two years have brought about conditions which have forced the liquidation of many valuable mines and prospects, and it is to these I particularly wish to direct attention.

In general mining men feel that the day has passed when good mines in first-class operating condition can be bought outright on favorable terms. Very few transactions of this character have been made in recent years. The developed mine, with adequate ore reserves blocked out, commands a high price. Owners are not tempted to sell when ore reserves show a promising future. It is particularly true that they will not sell on the depressed market for metals now existing. When operating costs began to rise in 1917 and 1918 the "ore in sight" in such mines was extracted and new development work was discontinued. Today the mines thus operated stand apparently exhausted and worked-out shells. Their owners cannot demand and get high prices for such properties.

Only Faith and Little Money Needed.

In the same class with these are a large number of excellent prospects which only require faith and a little money to develop them into valuable mines of the future. The big mine owner of the years close at hand will be the man who is willing now to invest in these inconspicuous properties which, to the casual observer, seem without much value.

This situation can be more easily appreciated if we take concrete examples to illustrate the conditions. It is a conservative statement, I believe, to say that the controlling shareholders of such developed properties in our own state of Utah as the Silver King Coalition, the Chief Consolidated, the Tintic Standard, the Bingham Mines and the Utah-Apex companies would not sell their control except at prices or terms which would either be impossible or unattractive to the buyers. These mines possess ore reserves largely developed; they have money in the treasury, and the owners would not sell their mines on the present depressed metal markets. On the other hand there are many promising small mines and prospects which now need capital and need it badly. These properties offer attractive opportunities to the men seeking legitimate mining investment.

Illustrative Opportunities Noted.

At the moment I know of one company which offers the control of its property to capital which will build a mill, and not a large mill, either; another company offers control to parties who will equip it with a power plant for drilling and hoisting, and this property has a production record of high-grade ore running into many hundred thousand dollars. Still another group of small owners offers its property—a prospect showing hundreds of dollars per ton in gold and silver values—to capital which will carry on the development work, and this offer is made on two years time on very attractive terms and price. So it

goes. These examples may be duplicated many times in the knowledge of every active western mining man.

Capital cannot complain that it is not receiving a fair deal when the owner will put his property into the transaction against new money to be spent in development, and let the money control the enterprise if the outcome is successful.

This manner of dealing shows the faith of the mine owners in their property; they do not undertake to "mine the pocket of the capitalist." They merely say, "We need money to make ours a producing and profitable mine. You put in the money and take full charge of the development of the mine and the disbursing of your own funds. If the outcome is successful, as we believe it will be, you shall have the control. If at any time you feel the investment will not be successful you may withdraw." This sort of proposal is an eminently fair one, and many such are today awaiting the acceptance of capital.

The Utah Copper Company was initiated on exactly this sort of basis. Capitalists offered to the late Col. E. A. Wall, the owner of the mines that formed the nucleus of the Utah Copper Company, sufficient money to equip and develop and put the property on the basis of a going mine. Col. Wall received a certain percent of the stock and bonds of the new company in exchange for his property, and the additional sum of \$250,000 in cash. He put his property in the deal against the money of the others, and they controlled the expenditure of their own investment. I cite this greatest copper mine in the world as an example of the development of a prospect into a mine which has paid more than \$115,000,000 in dividends since 1904. Surely the far-seeing owners of this mine did not go out to buy a developed mine. They knew even then that the big mine would have to be made with their money if they were to have the great profit of the speculation.

Now is Time to Investigate.

Now is the time to be active in the examination and negotiation for these mines. When the metal market advances the prices for such mines will not only advance but the owners will have funds with which to carry on their own operations, and they will not consider the sale of the mine on any terms. The present situation in the mining field parallels that described in the incident related of the elder Rothschild. Meeting him on the streets of London one day during the time of the French revolution a friend asked, "Mr. Rothschild, what securities do you advise me to buy?"

"Buy French *rentes*," said Rothschild.

"You can't mean that seriously," said his friend, "the streets of Paris are running with blood, and the French *rentes* are worth practically nothing!"

"Precisely so," retorted Rothschild, "and it is because the streets of Paris are running with blood that you can buy their bonds for almost nothing."

So it now is in mining. The years of 1920 and 1921 have drenched the mining fields with the financial blood of mine owners. Many have been forced to the wall, and the careful investor now finds alluring opportunities lying strewn in his path. The shrewd operator will not wait too long before selecting and making some of these attractive chances his own.

Some of the largest mining companies already have sent men into the field to look for these smaller mines. They see the advancing markets in copper and zinc; they see lead with a rising market rather than a falling one before it; they see the silver produced in the United States with a fixed market of \$1 per ounce for several years to come, by virtue of the Pitman Act; knowing these funda-

atals are right they are not hesitating to go abroad and ready to sail with the flood-tide of prosperity. They are not waiting for the tide actually to be at hand before initiating the venture.

It requires some months to get production under way. The mine is to be handled properly and with due regard to its ultimate good. Operating costs now are getting back to normal, and the metal markets are showing rising prices. Now is the accepted time to examine the offerings in the market, acquire the properties and start operations.

BUSINESS FORECAST FOR 1922

By the National Bank of Commerce, New York.

Conditions in the United States today indicate that the year 1922 as a whole will be more satisfactory to business than the year just ended. Our forecast is that profits will depend more on economy of operation than on expansion of volume. With the many favorable factors now operating, business men should not fear to make plans for the new year, but they should plan with care and conservatism, and with a constant effort toward reduction of costs.

Financial improvement continues. Progress has been made in reduction of excess stocks of manufactured goods. Accumulations of raw materials have been reduced. The rate of production in the major industries has shown little change during the closing weeks of the year. Losses in some lines have been offset by gains in others, the net result being that the gains over the low level of the earlier months of 1921 have been held.

Banking Position

The last twelve months have witnessed great progress toward stable financial conditions in business. Combined reserves of the twelve Federal reserve banks have increased by more than 40 per cent, while discounts for member banks have dropped 56 per cent and Federal reserve notes in actual circulation have declined 28 per cent. The Federal reserve system once more proves to be a system designed to care for increase and decrease in the volume of credit, with the requisite elasticity to do this easily. The betterment in the position of member banks, while not striking, is nevertheless satisfactory.

Notwithstanding the consistent improvement in financial conditions, recovery in manufacture and trade has been slow. Unemployment in the chief countries shows little decline from the high point reached early in the year, and it may well reach new high figures during January and February, when normally there is an increase in the number of those out of work in North America and Europe. Manufactured goods continue to move slowly and uncertainly into the channels of consumption.

The Raw Material Problem

In last analysis, the business of the world rests on a physical, not a financial foundation. Failure of balance between world-wide supply of and effective demand for physical goods forced the violent readjustment of the last two years; a readjustment which will not be complete until this physical balance has again been established.

The wool situation illustrates particularly well the various factors which have prevented a return to normal conditions. It has continued to accumulate, partly because central Europe has not been able to purchase in the expected amounts, partly because an important part of the wool supply is a by-product, and partly because the building up of flocks is so slow a process that flock-masters re-

duce them only when they have given up hope of profits.

With curtailment of production and increased demand, copper stocks are showing reduction. The short American and Egyptian cotton crops have served to bring the world's cotton supply approximately to a prewar normal. Stocks of hides and skins are large in many countries but are moving more freely into consumption. The prices of rubber and sugar are still below the cost of production. Sisal stocks carried over from last year now constitute nearly two-thirds of a normal year's supply. The world's wheat production is in a satisfactory state of balance in that there is an adequate supply and a sustained demand. The American farmer, in the face of a new corn crop of 3,152,000,000 bushels, is carrying over 281,000,000 bushels from the record crop of 1920. There is also an accumulation in other less well-known commodities.

This accumulation of physical goods is not a misfortune. It assures to the world a supply of cheap food and clothing, and real prosperity has never rested on any other basis. But producers of raw materials constitute much more than half of the buying power of the world, and the conclusion is inevitable that the entire economic structure will gradually adjust itself to the raw material market.

Disarmament and the Economic Outlook.

The essential step toward recovery is removal of the burden of expenditures for war. The countries which are wasting their money and effort on armaments are those whose markets must absorb the world's excess of raw materials, and pay for it with manufactures.

The terrific burden of war debts and preparation for war is clearly shown by data recently prepared by the Federal Reserve Board. The board states that in 1920, of a total net public expenditure by Great Britain of £1,145,928,000, 30.5 per cent were for public debt charges and 25.5 per cent were for national defense; by France, of a total of 52,183,217,000 francs, 22.7 per cent were for public debt charges, and 50.7 per cent were for national defense. In 1919, Italy's total public expenditures were 32,150,000,000 lire, of which 8.4 per cent were for public debt charges, and 83.9 per cent for national defense. German expenditures in 1920 were 61,470,870,000 marks, 14.5 per cent being for public debt charges, and 60.2 per cent for national defense.

Expenditures for the payment of interest and principal of the public debt do not curtail current purchasing power. They merely transfer it. That curtailment occurred when in the first place the debts were incurred for military and naval purposes. But current expenditures for national defense constitute a direct levy on the present purchasing powers of a people. Labor expended to make guns and submarines can not pay for hides from Argentina or wool from Australia.

It is too much to hope to destroy the anachronism of armament at one blow, but in so far as concrete results may be attained, they offer the first real hope of recovery from the economic stagnation of the world. A combined saving by the United States, the United Kingdom and Japan on armaments of only \$500,000,000 in a single year is equivalent to the prewar value of the exports of wool from both Argentina and Australia for nearly three years.

In keeping with the trend of the times the Hercules Powder Co. announced, at the beginning of the month a cut in list prices of blasting caps as follows: No. 6 blasting, \$3 per thousand; No. 8 blasting \$5 per thousand; on blasting caps for copper wires \$1 per 100. A revision was also made in quantity discounts which dealers may get upon request at any Hercules office.

Comparison of Mining Costs on Two Scales of Development.

By Letson Balliet, E. M.

PREFATORY EXPLANATION: This article is a rewrite of a letter written for the officers of a mining company, which has a mine 600 feet deep, with a mill on the ground, and with extensive workings showing faces of good ore, but which needs \$100,000 in development and modern equipment to become an efficiently operated mine. It is now idle, and cannot pay through the present methods. The officers want to "sell stock"—to put the mine in shape—though they have only a minority interest that can be sold. They expect to raise \$100,000 with only 20% of the stock in the treasury. The proposition is not attractive to big investors. The only solution possible was the co-operation of the stockholders. The mine has merit, but to "fritter away" the money from a few stock sales each month, accomplishes absolutely nothing, and there must come an ultimate end, failure and reorganization, unless the money is husbanded and accumulated until enough is raised to accomplish the results.

There are many companies with more or less merit, somewhat similarly situated, and no doubt every mining investor in the country, and every reader of this magazine has some stock in some company in this shape. Therefore I think this article will have considerable interest in certain directions. I have rewritten it, and changed every figure, and eliminated every condition that could possibly identify the mine I wrote the original advice for.

This presentation is not intended to expose the financial condition of a well known company, nor to advertise it, and if other companies can find any way to benefit by the application of the advice given to this company, it can be done by changing figures and rates to suit the conditions. This is given publicly to help legitimate development of meritorious mines, many of which need financial assistance to complete well advanced work. Since there is but "one crop" in any mine, it is evident that new mines must be developed to take the place of those which are now harvesting their crop.

LETSON BALLIET.

The mining laws of most states do not permit one man to work alone underground. At least two men must be employed in the mine. It makes no difference, then, whether there be two men or forty underground, there must be hoist engineer and top men employed. If there are many more men than forty it may be necessary to have two blacksmiths or timberframers, or even more, depending upon circumstances.

For the purpose of this comparison we will assume that all employees receive \$5 a day, including electricians, timber-framers, blacksmiths, steam engineers, pipe fitters, hoist engineers and miners. Where local conditions have a different wage, it will be easy to substitute the figures of the district.

RELATIVE COST OF DEVELOPMENT

With 2 Miners Underground		With 40 Miners Underground	
1 hoist engineer	@ \$5 a day	1 hoist engineer	@ \$5 a day
1 blacksmith	\$5 a day	1 blacksmith	\$5 a day
1 timber-framer	\$5 a day	1 timber-framer	\$5 a day
1 top laborer	\$5 a day	1 top laborer	\$5 a day
4 men costing	\$20 a day	4 men costing	\$20 a day
4 men for 30 days	\$600 a month	4 men for 30 days	\$600 a month

TOP LABOR SAME IN BOTH CASES

2 miners @ \$5 costs	\$10 a day	40 miners @ \$5 cost	\$200 a day
2 miners @ \$5 cost	\$300 a month	40 miners @ \$5 cost	\$6000 a mo.

Assuming that 40 miners do just 20 times as much as 2 miners, we find that it would take the 2 miners 20 months to do the work that 40 miners do in one month. Therefore—

2 miners for 20 months cost \$6000—exactly the same as 40 miners for a month, or \$6000.

But we find that top men at \$600 a month for 20 months cost \$12,000.

Top men for 1 month cost \$600, saving \$11,400, and 19 months' time.

But even this is not all the cost. The mine and the works must be lighted for 20 months instead of one; the buildings must be heated for 20 months instead of one; phone, water, fire protection, insurance, superintendent, foremen, office expenses, taxes, repairs, interest on \$11,400 more money for 20 months, instead of less money for one month. Another thing: repairs to track and underground timbers, etc., with 2 men, stops progress while repairs are being made; with 20 men repairs are kept up without stopping progress. Therefore, 40 men do more in one month than 2 men do in 24 months.

If a partially developed mine can be made to produce in six months with 40 men, it would take at least 12 years

with 2 men underground to open it on the same scale. Therefore—

Top men @ \$600 a month for 12 years cost \$600x144 months or \$86,400.

Top men for 6 months @ \$600 a month cost but \$3,600.

Saving in top labor alone \$82,800.

2 miners for 12 years cost \$43,200—40 miners for 6 months, cost \$36,000.

Saving in underground labor \$7,200.

Besides that you have 12 years of insurance, taxes, repairs, light, heat, phone, water, office expense, and lay-out of the interest on your money for 12 years, instead of 6 months, and have to put in nearly three times as much money before you get dividends.

If the mine can be opened with \$100,000 in six months, it can't be opened with less than \$300,000 in 12 years.

This compilation is intended to show the relative efficiency of husbanning the money, until enough has accumulated to perform the work quickly and economically, and not fritter it away a few hundred dollars at a time.

It is obviously true that some ground stands up with less timbering than others, some ground is harder than others, some mines are wet, causing pipe lines to rust faster than others, and also that some mines have to pump water. If pumping is necessary it will require three shifts of pump men to keep the mine unwatered for two men, just the same as for 40 or more. There must be a hoist man on top if there is a pump man underground at the pumps, which means an addition of at least 2 more hoist engineers and two more pump men, for pumping must be continuous. Obviously miners could not work in the day time if the mine filled with water every night. Wet mines must be run three shifts of eight hours each in every twenty-four hour day.

It will be argued that the blacksmith might frame the timbers too, and save a timber-framer, if only 2 men are employed. Sometimes this can be done, but it is also true that a mine teamster can haul supplies for 40 men as well as for 2, and it is also true that painting buildings and putting on new roofs, etc., would take extra men at times for doing work the blacksmith could not do.

Again, some mines may have a railroad right under the ore bin, while others may be 100 miles from the railroad. Some mines may have cold winters and be snowbound for six months, and others may be in a warm climate.

We also find that there is a great tendency to use makeshift methods and obsolete equipment, resulting in slow work, that would not be thought of with rapid development.

Another Angle of View in the Expense.

Assuming, for the purpose of comparison, that each underground miner breaks down and sends to the surface 5 tons of rock or ore per day, we find that 2 men underground produce 10 tons at a cost of \$1 per ton, but \$20 a day top expense adds \$2 a ton for top labor, making a total labor cost of \$3 a ton for every ton hoisted.

Forty men underground producing 5 tons each would make a total of 200 tons a day at \$1 per ton, but with \$20 top expense the cost per ton is but 10c, making a total expense of \$1.10, or a net saving of \$1.90 a ton on the labor item daily. If this ore and \$1.90 a ton for 200 tons is saved, it leaves \$380 a day, \$11,400 a month, or \$168,800 a year to go into the profits or dividends. Of course, the other

ms of overhead expense, mentioned above, are all saved, the actual saving is much greater than \$1.90 a ton.

All the overhead expense is a dead outlay when the stockholders are putting it up for 12 years, with no returns for that time, but if it is rushed into production in six months the mine carries its own overhead and the profit net.

I have before me the annual report of six mines, all located in the same district, under the same geological conditions. The cost per ton varies from \$6 per ton to \$13 per ton. Yet some one said, "What man has done man can do," but no one thinks to inquire why one has a greater cost per ton than the other. Each report shows where the money went and they all look right, but the net result is that one mine has \$7 a ton more in the dividend fund than the other. I can think of a dozen reasons (?) or excuses that might be offered by the one with the high cost, but excuses don't pay dividends.

Permanent improvements, small production, obsolete equipment, heavy overhead, etc., form a convenient burying ground for money and are covered up in cost per ton. There is a profit over the \$13 a ton everybody is satisfied, but what becomes of all the \$12 ore that has to be left in the ground because it will not pay expenses, that would pay 100 per cent if it came from the mine with \$6 cost per ton?

A Personal Experience Recounted.

I had a little experience, entirely outside of mining, but it is illustrative. As an engineer I estimated the cost of a construction job under the head of permanent improvements, to be \$30,000, and was directed to make the installation. The labor and materials were carefully figured, and I kept track of every hour's work, cost of labor and of every item, even including my own pay. I beat my own estimate by \$600, with a construction cost that I could have contracted for \$29,400 and broken even.

A few weeks later the directors called me in and said the job actually cost \$45,000, and showed me the cost sheet prepared by the "Cost Accountant." He had added several thousand dollars to labor and increased all material items 50 per cent. I produced my figures to show what I actually had cost, and the cost accountant was called in. He insisted that his account was correct. I insisted that mine was not. Finally he said he had added "overhead" to the cost, but I maintained permanent improvements were not themselves "overhead," and why add "overhead" to "overhead."

In the course of the more or less heated conversation, he informed me that he was the cost accountant for the company, and that I was not. I replied by saying, "You are not a cost accountant—you are the SEXTON TRYING TO BURY A LOT OF MISSPENT MONEY. If you want to add your stenographers and bookkeepers and your own salary as expense, ADD THEM TO YOUR OWN OVERHEAD, DON'T ADD THEM TO MINE, for I could have done the same work if you had been at the North Pole. If I had taken a contract to make that installation you would have paid me the \$30,000, and have cost what you have now. How could you have put in your \$15,000 overhead on a contract?"

I should dislike very much to be compelled to make a report to my directors that I had \$7 a ton more overhead than other mines around me. But as they are all paying, nobody seems to care. If the directors do kick some day, I suppose the manager will try to reduce the wages of his workers to make up for his inefficient overhead.

While these figures do not pretend to be accurate computations upon the development of any mine, they are in-

tended to be relatively illustrative of the necessity for competently financing a mine before the work is started. More mines fail of results from incompetent financing than from all other causes together.

Getting at Leaks or Expense Losses.

I have been able to get at the leaks or expense losses very satisfactorily by dividing my labor into six classes, viz., producers, developers, service, surface improvements, upkeep and office. I do not necessarily divide the men, but carry a job number for each department, and a workman taken from the mine to run an errand for the office is charged to the office for that period of time. A carpenter from the timber shed used in the office is charged to office for the time so employed. Then if any department shows costs too high, the cutting can be done where it should be done, and will save a quarrel with the men by not cutting their wages.

The hardest part of any really big mine promotion is to get the stockholders to co-operate with the management. They make all kinds of excuses for not putting up sufficient money to perform economical work, and then ask the manager for slow progress and idleness, when in fact it is the manager why the mine doesn't work, or doesn't pay.

It must be understood that a mining company is in effect a partnership in which there may be several hundred or a thousand stockholders or partners. Any one of these partners may be designated by the rest of the partners to act as directors or officers. YOU might be elected at the next stockholders' meeting. WHERE WOULD YOU GET THE MONEY TO PAY THE MEN UNTIL PRODUCTION STARTED?

You would naturally expect the rest of your partners to put up their share of the expenses as they would expect their share of the profits. You couldn't put up all the money yourself to open the mine, for perhaps you haven't that much. Most of the stockholders would write you and tell you to sell some stock for the money. But if you couldn't sell the stock NOW, you couldn't sell it when you were an officer.

Where Stockholders Should Count.

The directors have no money to handle, nor with which to work the mine, unless you furnish your share as an interested partner. The directors and officers are supposed to handle the business, see that your money is properly protected, and to see that you get your share of the profits. They are not supposed to raise the money. You are supposed to raise the money and they to direct its proper disposal.

Stockholders are prone to blame the directors and man their own fault because they do not provide funds. Your mine will never pay dividends if you do not provide the ones you have elected as officers with the necessary funds to work it.

If you find fault with your mine and knock the business, you are KNOCKING MONEY OUT OF YOUR OWN POCKET, AND REDUCING THE VALUE OF YOUR OWN STOCK AND YOUR OWN BUSINESS.

If you are a stockholder in a mine, you are a part owner in the business of that mining company. You should boost it, work for it, and help to raise the funds necessary to make it a profitable business. If you were a part owner in a grocery store you'd trade there. If you put more money into the business you have a greater interest in it. If it needs more money to properly complete the work to a producing stage, YOU MUST PUT IN MORE MONEY, OR YOU MUST INTEREST SOME OF YOUR ACQUAINTANCES TO PUT IN MONEY AND

JOIN YOU, or you will never get a cent out of it. Your officers can do NOTHING without your help.

Sometimes a stockholder can return a few hundred dollars worth of his stock to the company which can be sold to others and you thus provide the money. In such cases it is often better for you to have 1,000 shares that pay dividends and become worth \$10 or \$15 a share, than to have 2,000 shares that pay nothing, and have no value unless the mine is producing.

If you have stock in a mine that needs further development and equipment, the question is WHAT WILL YOU DO TO MAKE THE MINE PAY? You will never get a cent unless you do something. You can not sit quietly back and expect others to make a business for you.

Success can be assured by saying something, doing something and being something.

If you are a stockholder in any mine or business anywhere, write to the secretary, say something, do something and be something more than one who is sleeping on the job. Give him your co-operation.

Even if you have a good property and competent engineering talent to direct its production, it takes money to hire the men and start its production. You must help get that money, for you are only blocking the progress of your own dividends if you do not.

Many good mines are now idle because the stockholders STARTED and then turned QUITTERS, and a quitter is always a load to carry, and frequently a KNOCKER. It isn't the fellow who STARTS who wins the big success, it is the fellow who FINISHES. Ask yourself the question, "Am I a quitter or a FINISHER?"

REVIEW OF OIL OPERATIONS IN UTAH DURING 1921

By J. D. Heist*

In spite of the fact that the oil world passed through a period depression during the past year, prospecting for oil in Utah made satisfactory progress. Considering that this was Utah's first year in active drilling operations with the efforts distributed over a wide area, the results compare favorably with the initial efforts in other states and which later came into national prominence as oil producers.

A review of drilling operations in the several counties of Utah for the year 1921 follows:

BOX ELDER COUNTY: The drilling in this county is being prosecuted along the shores of the Great Salt Lake, in the vicinity of the asphalt beds, west of Promontory Point.

The Leonora Mining Company built a 1300-foot pier out over the lake and installed a drilling rig, spudding in during the month of October.

The Zion Asphalt Company of Utah, which has contracted to drill 100 wells for the Asphalt Company of Utah, now known as the Great Salt Lake Oil and Asphalt Company, started drilling Well No 1 during October. The latter company have three wells producing a heavy oil and during the past year it has been demonstrated that this oil is very desirable for flotation purposes.

The Nebeker interests at a depth of about 400 feet, have a showing of gas and oil.

During the past year this field has attracted considerable attention and an extensive drilling campaign is contemplated for the coming year.

CACHE COUNTY: The Cache Valley Oil Association operating in Sec. 25, T.13 N., R.1 W., S.L.M., at a depth of about 1650 feet, encountered a strong gas flow and

oil showing estimated at from three to five barrels per day. The oil is found below the lake wash of ancient Lake Bonneville, in Carboniferous sands and is said to be of good quality and high gasoline content. Tests of the gas are reported to class it as "wet".

CARBON COUNTY: The Utah Oil Refining Company spudded in on the Farnham Dome during the month of August. At the end of the year a depth of about 1600 feet had been attained, with strong gas pressure and some oil showings, which may be indicative of the results when the Permian sands, the objective, is reached.

The Leonard Petroleum Company, a Pennsylvania corporation, leased adjoining acreage paying a substantial bonus in addition to a drilling agreement.

DUCHESNE COUNTY: On the Duchesne Dome, 6½ miles southwest of the town of Duchesne, the Utah Southern Oil Co. has set the 15½ inch casing at the depth of about 180 feet, and rapid progress is being made on the well.

EMERY COUNTY: On the Castledale structure, 3 miles east of Castledale, the Castledale Oil Co., at a depth of about 600 feet, suspended work for the winter. This same company has installed a rig on the Rochester Dome, but drilling is not yet under way.

The Huntington structure was tested by the Ohio Oil Company during the past year. This was a test of the Cretaceous age; the Ferron member of the Mancos shale was found to be coal-bearing and the Dakota sandstone was dry. The well was abandoned at a depth of 3100 feet, before the upper McElmo formation was reached.

The Salt Wash structure is being tested by the Leonard Petroleum Company. Rapid progress is being made in this well and at a present depth of about 1800 feet approximately 1000 feet separates them from their objective, the Moenkopi oil sands.

To fulfill the requirements of prospecting permits issued under the terms of the Leasing Bill, the Utah Oil Development Company, a Chicago concern, started two wells in this field, each 500 feet deep; the Utah Oil Refining Company drilled a similar validation well to a depth of about 800 feet.

Probably the section receiving the most attention during the past year was the San Rafael Swell with the following active operations: The Carter Oil Company is making good progress and is down over 2500 feet.

Henry A. Schweikhart, the Old Emery Oil Company, the San Rafael Oil Corporation and the Reserve Oil Company of Utah have been drilling in this field during the year.

Considerable work of a geological nature was performed in this field during the past year by prominent oil concerns and the entire area has been filed on by applicants under the terms of the Leasing Bill.

GARFIELD COUNTY: On the Circle Cliffs structure, the Ohio Oil Company drilled to a depth of 3212 feet at which point they abandoned the test.

GRAND COUNTY: The Crescent Eagle Oil Company is developing a group of placer claims in the vicinity of Crescent, a station on the main line of the Denver and Rio Grande railroad. The claims were initiated in 1919, and during 1920 validation work was performed with a portable rig. A deep test was started with a heavier rig during 1921 with the intention of drilling to the Permian sands. Oil colors and gas were reported by the drillers during December.

At Moab four companies consolidated in one test well. The companies interested in the test are, the Embar Oil Company, the Standard Oil Company of Utah, the Big Six Oil Company and the Western Allies. A depth of 1800

*Of Crocker and Heist, civil and mining engineers, Salt Lake.

feet is reported with oil and gas showings at intervals after passing 800 feet.

At Cisco, the Utah-Arizona Oil Company started a test during the month of November.

SAN JUAN COUNTY: The Monumental Oil Company of Tulsa, Oklahoma, spudded in on the Hulkito structure during December. This structure is located on the south side of the San Juan river, in the Piute Indian reservation.

As valid oil discoveries were made on a number of placer claims in the Goodridge oil field prior to the petroleum withdrawal in 1909 and as this withdrawal was vacated upon the passage of the oil and gas leasing bill, work on these placers has been resumed.

During 1921 numerous placer claims in this field were surveyed by U. S. mineral surveyors for patent. About 400 claims were filed on in this county during 1921 under the terms of the Oil and Gas Leasing Bill.

SAN PETE COUNTY: On the Ephraim Dome, the Utah Central Oil Co., on Sec. 3, T.17 S., R. 3 E., S.L.M. reports a depth of 480 feet.

The Producers Oil Co., on Sec. 27, T.16 S., R.3 E., S.L.M., reports a depth of 925 feet. The well was spudded in during May, 1921. At 199 feet, there was a slight showing of oil and gas, at 365 feet a stronger showing appeared, while at 719 feet a heavy black oil was produced.

Oil was discovered on this structure several years ago in the Poulson well, when oil was struck at 540 feet and the well abandoned when a heavy flow of water was encountered at about 600 feet.

UTAH COUNTY: In Diamond Fork canyon, near Thistle, the Gustaveson Oil Company resumed drilling Gustaveson No. 2 well. It reports two showings of oil, the first at less than 100 feet and the second showing of oil and gas at about 600 feet. Well No. 1 was abandoned on account of a serious cave-in.

SUMMIT COUNTY: On the Coalville structure, the Western Empire Petroleum Co., (WEPCO) drilled several hundred feet when work was suspended for the winter. The company expects to complete this test during 1922.

UINTAH COUNTY: The Hill Creek Oil and Refining Company is having a test drilled on the Hill Creek Dome. Several hundred feet in depth have been obtained and the drillers have reported one showing of oil colors.

The United States Oil Company of Utah spudded in on the Jacob Evans claim in this field and the Midwest Refining Company have all the material on the ground for a test on Section 32, T.14 S., R.20 E., S.L.M.

On the Moffat structure, the Uinta Oil and Exploration Co. is working on two wells. Well No. 1 is down about 800 feet and Well No. 2, 1200 feet.

Three miles south of Roosevelt, the Hansen well was started in October to test a shallow sand believed to lie at about 400 feet below the surface.

WAYNE COUNTY: On the Nequoia structure, the T. C. Conley well has reached a depth of over 1000 feet. This test has been watched with interest as it will prove a considerable territory.

On the Caineville Dome, the Ohio Oil Company, at a depth of 2700 feet, has considerable trouble in a cavey formation. This well is within a few hundred feet of its objective, the Moenkopi sands.

On the same structure John E. Fennerty of Findlay, Ohio, installed a rig during the year and drilled several hundred feet.

WASHINGTON COUNTY: The Virgin Dome Oil Co., on the Harrisburg Dome, reports a depth of 2483 feet, with some oil and gas showings.

In the Virgin City oil field the Mohave Oil Com-

pany drilled one new well, reconstructed the refinery and are pumping oil from four wells. This is a shallow field, the productive sands being less than 600 feet from the surface. The capacity of the refinery is about 150 barrels per day.

Mining in White Pine County, Nev., 1921.

By George H. Ryan, E. M.

On account of high-freight rates and the general drop in metal prices which ushered in the year just passed the mining industry in eastern Nevada has languished almost to the point of extinction. Beginning late in the year 1920, the large shipments of lead and zinc metal sent over from European countries for sale on the American market, caused prices to sag to an appreciable extent and right along with this the railroads of the country, in a panicky and ill-advised attempt to recover from the effects of government operation, made an increase of 25% in the already high rates, which had the effect of thoroughly strangling those businesses which had survived the former rate increase.

One might even draw a parallel to Mark Twain's story of the Jumping Frog and by paraphrasing it somewhat say that the mining and other businesses furnishing revenue for the railroads were able to continue to jump after swallowing the first rate shot of 1918, because of the abnormal state of conditions prevailing, but when the carriers made the revenue-producers swallow the rate shot of 1920, the load was more than they could carry and continue to jump. However, all these questions will eventually be worked out in the readjustment we are now going through and the year 1922 holds much promise of a revival for the mining industry.

Nevada Con. and Con. Coppermines

The main producer in White Pine county, the Nevada Consolidated Copper Company, closed its mine, mill and smelter early in the year, reducing the working force to about 250 men. At the mill and smelter alterations and repairs were made to put the plants in condition for resumption of operations when conditions warranted and at the mine development of the large bodies of direct smelting ore were continued, with the result that now the Ruth mine is in better condition than ever. The discovery of this direct smelting ore in the Ruth is the most important find in eastern Nevada, as it adds greatly to the importance of this property and points the way to further exploration along the contact between the porphyry and limestone. The large amount of surplus copper which was piled at the converter at McGill was shipped during the latter part of the year and the plant is in readiness to resume operations which, according to present indications, will be early in the present year.

The property of the Consolidated Coppermines Co., at Kimberly, stopped the pumps and let the water rise in the workings. Resumption of work at this property is problematical, owing to the fact that operations on a large scale necessitates the erection of a suitable mill and smelter, so, until market conditions warrant the financing of so large a project, there is not likely to be much activity at Kimberly. This property has been very ably and systematically developed and there is reported to be a large tonnage of direct smelting, oxidized ore, developed and waiting extraction. This ore has been developed in the limestone near the porphyry contact and the deposits have been opened to a considerable extent. The Con. Copper Co. also has a large tonnage of low grade porphyry ore developed by

drill holes, but until a mill and smelter can be erected this ore can not be exploited.

Boston-Ely Developing New Find

A find of great importance to the Ely district was made in the property of the Boston-Ely Company which has been carrying on exploration work in the Ely-Northern ground about a mile west of the town of Ely and on the north side of Robinson canyon. Some small deposits of oxidized ore are exposed on the surface of this property, but no attempt was ever made to prospect the territory at depth until the present management started a campaign of intensive and systematic development which has resulted in finding a good sized body of copper ore which can be mined and shipped at a small profit, even under the present exorbitant rates.

This property is a good example of the way the present railroad rates prevent production. Ore of this character, at the present price, could be shipped at enough profit to allow a surplus over development costs if the rates on low grade ores were adjusted so as to encourage shipments. There is always a ready market for this class of ore when the large copper properties are producing and operating their smelters; but the value of this ore puts it into the second classification in the freight tariff, which in this instance increases the freight \$1.97½ per ton. The variations in the tariff are on \$15 and \$25 valuation and if the low grade rate were made to apply up to \$25 valuation there is a large tonnage of ore coming under this valuation which could be shipped from the eastern section of Nevada.

Ely-Calumet Has Large Zinc Deposit

The same argument applies to the zinc deposits of the county and to the low grade lead-silver ores. The Ely-Calumet has opened a considerable tonnage of zinc in their property about a mile north of Ely and have built a road to the mine, but under present conditions they can not ship any ore, which makes further development a very heavy burden on the owners.

The old Ward mine, 18 miles south of Ely, has a large tonnage of low grade lead-silver ore valuable for fluxing and the property started to make regular shipments to the Salt Lake smelters. The bulk of this ore comes under the \$15 classification and after much effort the management secured a rate of \$3 per ton, up to \$15 value and commenced shipments; but the increase in smelting rates due to the increased bullion freight, and the high freights from other sections of the mining country which prevented the smelters from getting the variety of ores necessary to successful smelting, resulted in the closing of this mine early in 1921 and it has remained idle ever since. Only a few men have been retained to do some development.

Operations at Cherry Creek and Hamilton

At the old silver camp of Cherry Creek some development work has been carried on during the year at the Mary Ann, Star, Imperial and Black Metals. The two latter have made some shipments of siliceous silver ore of good grade and recent work indicates that the present year will witness a continuance of production. The lower tunnel at the Mary Ann has reached the mineral zone and exploration work is under way. The Star is driving for the downward extension of the Gray Eagle vein and there is a possibility that the company will undertake the milling of the large tonnage of stope-fill and low grade ore blocked out in the mine. The Imperial has made the largest production of the camp and this old bonanza should show renewed life with the resumption of normal conditions.

In the old bonanza camp of Hamilton, in the western end of the county, recent work has been confined almost entirely to the development of the lead-silver deposits which lie to the west of Treasure hill. This ore carries better than half an ounce of silver to the unit of lead which makes it a very desirable product and the district offers exceptional opportunities. The present draw-backs to extensive and profitable development are transportation and lack of a proper metallurgical process for the concentration of the carbonate ores. The transportation problem could be greatly bettered if a broader and more business-like policy were adopted by the Eureka & Palisade railroad, which would result in greater revenue to both producer and railroad as the problem of successfully treating the ores at the mines is already in a fair way of being put on a profitable basis.

While speaking of the mining business of this district it is well to mention the fact that there is a prospective oil field in the Illipah Basin northeast of the camp, where test holes are being put down, with the result that the hole of the Illipah Petroleum Company got a fair sign of oil during the year's operations and further development of this field is being watched with a great deal of interest by those familiar with the district.

In Some of the Other Sections

The other localities which have been the scene of mining activity during the past year are at more isolated points where the distance from transportation make it necessary to mill the ore at the property. Chief among these mines are the Argus at Taylor, under bond to the Wyoming Mining & Milling Company, the Lake Valley mine just south of the county line on Patterson mountain, the Piermont mine on the east slope of the Schell Creek range east of McGill and two or three properties in the old gold camp of Osceola.

At Taylor the Wyoming company has a mill erected for the purpose of working the old cull dumps which contain a large amount of low grade silver ore as well as a considerable tonnage of low grade ore developed in the mine. This mine was a heavy producer in the 80's and should be able to come back under present conditions.

The Lake Valley Company has erected a cyanide mill at its property and will soon be in shape to begin operations. This old mine has produced some very rich ore and has developed a good tonnage of mill ore which should make a good return to the operators.

The old Piermont mine, which produced nearly two million in silver in the 70's by treating the ore in an old amalgamation mill has been doing development work for some time and has opened some good milling ore in addition to the ore left exposed in the old workings.

Osceola Again in the Running

At Osceola the Baird-Tilford property has been steadily developed and several mill runs were made on ore extracted during this work. The results have been fairly satisfactory considering the handicaps under which the owners have had to work. The mill is at a considerable distance from the mine which makes operation unduly expensive, but it has demonstrated the possibility of profitable production from these gold veins when they are worked under proper conditions. This is possible here as there is water sufficient for milling operations and the ore is of such character as to not offer any great metallurgical difficulties.

Capital sufficient to equip some of these properties and provide milling facilities would undoubtedly earn a good return on the investment, as the ore is easily mined

and a centrally located mill would make possible the operation and development of much good territory.

The Mariott brothers have been developing one of their groups of gold claims and recently have repaired the ten-stamp mill and started to make a run on the ore from the property just west of town. This mill is equipped with amalgamation plates below which tables have been placed which should prove to be of great value, as some of the gold is associated with iron and does not seem to be readily amenable to amalgamation; but, as shown in the operation of the Baird-Tilford mill, the concentrate recovered below the plates would bring the extraction up to a very profitable point.

It is reported recently that the St. Lawrence mine, situated on the west slope of Wheeler peak, southwest from Osceola, is to resume operations in the near future. This is a lead-silver property reputed to have a good tonnage of ore opened up.

The Muncy Creek mines have been idle during the year, including the Siegle mine and other properties in this locality, but with a resumption of the smelters and betterment of the metal markets this district will doubtless show renewed activity. The Muncy Creek mine has a large amount of zinc ore as well as copper and silver and the Siegle has a considerable amount of manganiferous silver ore, some of which has been of shipping grade, but the successful treatment of this ore at the property would make it possible for production to be resumed.

McCoy District's New Discovery

The most important discovery in new territory was in the McCoy district on the east slope of the Schell Creek range and just south of the Piermont district, which the new camp joins. The Millick brothers began prospecting in this locality in 1920 and early in 1921 were rewarded by locating the origin of the float. They put down a prospect shaft, where the blue quartz cropped, and followed down along the edge of the ore body for a distance of 70 feet.

The ore shows to be from one foot to six feet wide and consists of a bluish quartz occurring in lenses and shoots along the contact between a rather soft granular blue lime and a dark brown shale in the Cambrian measures. The ore seems to be a silicification of the upper part of the lime member, occurring along a series of N-E, S-W fractures. The croppings show to be as wide as 15 feet and in some instances about 200 feet long.

The values are entirely in silver. No copper, antimony or other metals have been found, which makes this a very desirable ore for treatment by cyanidation. Values run very high in some of the assays made but the development so far would indicate that one might expect an average of about 15 to 20 ounces.

It will require considerable development to fully demonstrate the possibilities of this section, but this work can be done at much less expense than in most new districts as there is ample water for power purposes and mining timber can be secured in the higher portions of the mountains a short distance from the prospects. A great deal of development can be done by tunnels from near the bottom of the canyons running east and west across the direction of the contact.

This condition will be influential in making possible a great deal of work by the original locators and will be the means of proving the merits of the district, which at present look very favorable. The contact runs northerly and southerly along the eastern base of the range at an average elevation of 6700 feet, so that it is accessible at all times of the year. It is 57 miles from Ely by way of Connors

Pass and about 40 miles from Ray Siding on the N. M. Ry., near Cherry Creek, via. Schellbourn Pass.

The country rock consists of hard quartzites, loosely cemented granular quartzite, thin bedded shist and shale interbedded with a soft, loosely cemented, blue, granular lime occurring in rather thin strata and a massive brown shale, all Cambrian and lying conformably, with a north-south strike and westerly dip. These sedimentaries are cut by a large dike of diorite cutting across the formation and striking about north-south. There does not seem to be any mineralization along this dike, although there is a great deal of hard, white quartz associated with it. There is a series of N-W, S-E fissures, about vertical, which cut across the formation, and are filled with a hard quartz showing a good deal of oxidized iron, but so far these fissures have not shown any particular value, although further development may show that they make ore where they cross some of the lime strata. They are generally from a few inches to as much as 18 inches wide and seem to be very persistent.

Even though White Pine county has not made much of a production record during the past year, there has been a considerable amount of exploratory work which will result in the bettering of the physical condition of many properties and put them in shape to start when conditions warrant, and the present year should bring a great deal of activity in this section of Nevada as it contains many properties of exceptional merit.

MINING SITUATION IN THE PIOCHE DISTRICT

By E. C. D. Marriage, E. M.

Prosperity and depression and again justified hope marked the past year's mining operations in the Pioche district. In the early spring intense activity at Silverhorn, twenty miles westerly from Pioche, resulted in the influx of much badly needed capital and although the activity was short-lived, the publicity given the Pioche district at that time should work for ultimate future good. Insufficient development was done on the main Silver Horn properties to properly determine their value and engineers and mining men visiting the district turned their attention to other properties in the well mineralized territory. At the same time the broad, progressive application of the mining men responsible for the financing of the Silverhorn boom gave a much needed filip to mining generally in the Pioche district which will not soon be forgotten, for ultra-conservatism in mining is synonymous with stagnation.

Coincident with the cessation of activity at Silverhorn the closing down of the Prince Consolidated mine cast a further gloom on the camp, the Prince company having operated steadily for so many years that the loss of the payroll seemed hardly to be a reality. The Virginia-Louise mine had, prior to the Prince mine's closing, ceased development work and for the first time in many years both these great producing mines were placed on a care-taking basis. In June, Walter Harvey Weed, prominent mining engineer, made an extended examination of the Virginia-Louise mine and his report, stating an indicated tonnage of one million and a quarter tons of shipping ore, was one of the most encouraging factors of the year's developments.

Activity in Jackrabbit Section.

During the summer operations were initiated at the Black Metals mine at Jackrabbit under the direct supervision of James Quirk, former successful superintendent of the Prince mine, and before forty days had elapsed, a fine body of shipping ore was struck in this supposedly worked-out property and within another twenty days a production of 50 tons per day was commenced and continued, with ore reserves steadily increasing.

All through the year the Bristol Silver Mines, another Snyder syndicate property, has been steadily operating and shipping a car of silver-lead-copper ore a day, in spite of high freight rates and smelting rates which had been the direct cause of the closing down of the Virginia-Louise and Prince mines, with their lower grade ore bodies. Thus, notwithstanding the closing down of the district's two biggest shippers and the collapse of the Silverhorn activity, the payroll of the district has shown only a slight decrease and the number of operating properties has shown a decided increase.

Encouraged by favorable reports of prominent mining engineers of broad vision outside capital has, during the fall and early winter shown a decided partiality for Pioche and never has there been a greater number of legitimate deals pending than at this time. Leasing has also been given a substantial impetus by flattering reports of engineers and the faith of local operators and prospectors. The Mendha and Hamburg mines are both in the active shipping class again, as were also the Gypsy and Florence properties. Constructive development work was also prosecuted on the Highland Queen, the Great Western, the Highland Central, the Edwards-Sawyer group and a number of other properties of merit—in fact the Stampede-Highland territory was increasingly active following the boom at Silverhorn.

Eastern Side of Pioche.

To the east of Pioche a number of properties have been active. The Alps mine, owned by the Lloyd interests, was worked extensively and development was also carried forward on the Midway and Wideawake groups, though no shipments were made. The Price Yuba lease shipped two cars of gold-silver-lead ore during the year and the Mascot Lease, striking ore in November, made two shipments during the month of December, the initial car bringing \$1,500.00. A number of leasers have worked during the year on the properties owned by the Amalgamated Pioche Mines & Smelters Corporation and much development work has been done on the Currency mine, Yuba mine and Meadow Valley No. 7, while a smaller amount has been done on the Burke and Deerfoot claims. Shipments have been made from the Price Yuba, the Currency, the Zero, the Meadow Valley No. 7, the Deerfoot, the Nazeppa, the No. 3 dumps, the Depot Slag dumps and the Bristol slag dumps, all Amalgamated properties. The major operation on this company's territory has been the Combined Metals Snyder lease and, although the production has been nominal, the development work done has materially added to the already substantial ore reserves, which are now estimated to be worth \$1,000,000 in realizable value.

In the Outside Districts.

In the districts further distant from Pioche considerable development work has been accomplished. In the Comet district, especially, high grade ore has been mined on the Lyndon and Stella properties and shipments were made from both mines during the year, the production from the Stella being taken out by the Hybla Mining Company during the winter of 1920.

Silver Park, 50 miles north of Pioche, has lately attracted considerable interest and a number of properties have recently been bonded to astern investors. Work is now going on and will continue throughout the winter. Freiburg district was active and a mill was built by Ely people at Lake Valley. Shipments were made from Freiburg, Nevada Silver Horn and Silver Dale mines, the Lucky Tom mine and the Lake Valley mines, during the year.

The year 1921 was one of contrasts, but with assurances of lower freight rates and other favorable reductions in the cost of mining, the Pioche district has never had better reason to anticipate prosperity and production than at the present time.

Marysville, Montana, Stages Comeback.

By Rolland C. Neenan

Among the mining camps that helped to make up the hectic history of Montana's early years, Marysville holds a place of considerable eminence. Its glory is largely that of the past, but one need be but reasonably optimistic to foresee a future for the district as a mining center that will compare favorably with the boom days of the 80's—days when the Drumlunnon, the Belmont, the Penobscot, Bald Butte and half a dozen other producers of fortunes, made Marysville the centre of the mineral wealth of the Northwest.

Today the town itself has an air of delapidation. A fire several years ago wiped out a large portion of the business places and these have been only partially rebuilt. But the spirit of optimism is by no means absent. There are probably not half a score of residents who are not interested to some extent in mining, and there is none of these but can see in the operations being carried on at present a promise of an actual revival of the prosperous days of yesteryear.

Shannon's Productivity Stimulates Faith

The continued productivity of the Shannon mine has done much to keep alive faith in the potential resources of the Marysville district. It serves as an argument for development at depth, since the lower levels of the Shannon have been by far the most productive. In fact, above the tunnel level—200 feet—the ore was not of sufficient value to warrant the cost of stoping and timbering. This, while it is not proof positive that greater values lie at depth in all the undeveloped prospects of the district, should at least serve as an incentive for others to follow the old prospector's advice, and "always sink ten feet deeper before giving up."

The writer is not positive of the time the Shannon has been on a producing basis, but believes it is a little over six years—perhaps it is five. However, during this time an average of very close to \$1,000 a day has been recovered from Shannon ore—and is being recovered every day. The workings of the Shannon are almost directly under the county road that runs west from Marysville, the same road over which the freighters traveled in '78 to reach "Nate" Vestle's great strike, the Penobscot. Even at that date, or a few years later, Pat Shannon had discovered indications that promised to be of value. But for a third of a century he toiled away the best years of his life, and when at last a group of Helena promoters paid him \$30,000 for his "hole in the ground," poor old Pat lived just long enough to reach his old home back in Iowa—and die. Just one more tragic end to a prospector's toil and hope.

Penobscot and Bald Mountain in Line

I have mentioned the Penobscot as one of the bonanzas of a bygone era; but today there is an excellent chance of its becoming a profit maker once more. For a score of years, Matt. W. Alderson, alone and with practically no financial backing, showed his faith in the Penobscot, by placing all he had of time, of energy and of money in development work, by which he hoped to uncover another pay-shoot. At last it seemed that even Mr. Alderson's perseverance had reached its limit. He became associated with the Crystal Copper Company and was appointed manager of this company's mines—the Goldsmith in Butte, and the Crystal at Corbin, Montana.

However, after a lapse of several years, Mr. Alderson has succeeded in interesting the directors of his company in the Penobscot, and he has again begun operations—this time with ample finances and the assurance due to years

experience that he is on the right track to another pay-off. A tunnel is to be driven from a gulch west of the old workings. It is understood that this tunnel is between two other veins that in the past have given up values of immense proportions. No chance for driving into a real mine could be better, and it appears that Mr. Alderson's years of endeavor are to be finally rewarded.

Another old mine that bids fair to again become a dividend-payer is the Bald Mountain, controlled by the state of the late Thomas Cruse. Michael Hurley, superintendent and general manager of the Cruse mines, is in charge of development work at the Bald Mountain. Mr. Hurley is said to have opened up an entirely new vein in this recent work and it is understood that the stamp mill on the property is soon to be remodeled and placed in operation.

Drumlummon Leasers Doing Well

One of the outstanding incidents of the past few months is the record made by Zigmund and Will Smigaj, brothers, in leasing on the old Drumlummon. Since last September they have shipped fourteen cars of high grade gold ore to the East Helena smelter. This is especially remarkable since the ore is being mined from the sides of one of the big caves that pit the side of Drumlummon hill. A "whip" is the only means of bringing the ore to the surface. It goes without saying that the work is highly dangerous, but the returns from the smelter seem to justify taking a certain risk.

Were it not for a somewhat unreasonable system of royalties demanded by the St. Louis Company—owners of the Drumlummon—the old mine would undoubtedly afford opportunities for fortune to a large number of leasers. As it is, the percentage of returns demanded is so nearly prohibitive that the Smigaj brothers are the only group at work.

Many Valuable Properties Await Financing

Aside from the mines that are actually producing in the Marysville district, there are a large number that are waiting only for the necessary funds before they rank among the best. I cite a few: There is the Honeycomb, adjacent to the Shannon, a producer on a small scale in years past and containing at least one known large body of milling ore that has not been touched. There is the Bell Boy, in Towsley Gulch, from which several hundred thousand dollars have been taken, and on the dump of which is at present several hundred tons of good grade ore. There is the Nile, adjoining the Bell Boy, from which "Billy" Birkhead shipped \$5,000 worth of galena ore in one summer, breaking and hoisting it by windlass without help.

There is the Carbonate, at the head of American Gulch, half a mile south of the Shannon, which A. F. Neenan has held for over forty years and from which he has realized an average of better than \$1,000 a year from silver-lead ore he has mined, almost unaided. This particular property is handicapped by water, shaft work being the only means possible to develop. At present Mr. Neenan is operating from above water level from a winze on the hundred-foot level of his shaft. He has a whim, operated by a horse to hoist his ore from the shaft to surface; on the winze he uses as a windlass, propelled by a jackass.

Indeed, there are still plenty of opportunities for the Marysville district to stage a mining revival. And everyone looks forward to spring as the time scheduled for a resumption of activities in the mines of the district.

East Helena Smelter Helps District

The producers of base ores here are particularly fortunate in being within such a short distance from the East Helena smelter of the A. S. and R. Company. It is but

a trifle over twenty miles from the loading station at Marysville to the smelter. This relieves the shipper here from the expensive freight bills that are the bane of others less fortunately situated.

The treatment rates granted local shippers are also far from exorbitant. Mr. Adams has done much as manager of the East Helena plant to make the relations between shipper and smelter less antagonistic—more amiable, as it were. As in every district, there are chronic complainants against the mythical "smelter trust," but as a rule, the shippers from this district are free to admit that "the bunch down at the smelter are pretty square guys."

VOLCANO MINE IN NEW MEXICO

MAKING A SILVER BONANZA.

Las Cruces, N. M., Jan. 10.—High grade shipping ore and milling grade averaging 20 ounces silver over a width of 30 feet, not including four feet of horn silver ore on the hanging side of the wall, which averages more than 40 ounces to the ton, was opened up on the 100-foot level of the Volcano mine in Hidalgo county, northwest of Las Cruces, according to an announcement by C. W. Mitchell, president of the Volcano Mines company.

"The development work on the property was carried on by Engineer Wheelock, during my absence in New York. He has made remarkable progress. We now have three cars of this grade of ore ready for shipment to the El Paso smelter," President Mitchell reports.

"Driving on the 100-foot level in the north drift continues with three shifts by contract. On the 200-foot level we have opened up ore that is 15 feet in width and so far without hitting the walls of the lode. On this level we have four feet of high grade ore averaging 100 ounces silver per ton, as we are breaking it, the values being in horn silver and silver sulphide, with a fine showing of native silver. We are now sinking a winze on this ore body and now have 12 tons of it on the dump, the lowest average assay of this ore being over 100 ounces silver a ton. We have found specimens running as high as 710 ounces a ton, which did not include the ore containing native silver.

"We are also putting up a raise from the 200-foot level to reach the 100-foot level, for still further demonstrating the extent of the ore body, and for ventilation purposes. Driving the drift north on the 200-foot level continues as fast as possible, as on the surface north of this drift the ore body which we are just getting into on this level outcrops for a distance of 1,200 feet with a width of 20 to 50 feet. On the 200-foot level we shall have to run the drift over 100 feet north to get into the shoot of high grade ore we found on the 100-foot level from which we are now shipping.

"Timbering the shaft is under way from the 200 to the 300-foot level. The face of the north drift on the 300-foot level has the best showing in the mine. The full width of the ore on the 300-foot level, five feet, shows silver sulphide as the principal content, and is the best looking quartz of a permanent character yet discovered in the mine. Our average assays on ore from this level have been better than that on the upper levels, and this is a different ore-shoot than that of the upper levels. To encounter the same shoot that we have on the upper levels we shall have to drift north about 200 feet.

"E. R. Ramsey, representing the Doyle Company of New York, is at the Volcano mine, making plans for a cyaniding mill of at least 100 tons daily capacity," Mr. Mitchell said at the close of the interview. "We expect

to have the plant in running order early next summer."

Sam Hidalgo of Hillsboro, and A. H. Reynolds and T. E. Bartlett, both of El Paso, are receiving rich ores from the new gold camp at Goldboro, northwest of the Elephant Butte irrigation dam and lake in Sierra and Socorro counties, north of Las Cruces. The samples, taken at the southeast end of the San Mateos mountain, are both rhyolitic and porphyritic and show free gold and silver-sulphide. Mr. Hidalgo is working his claims and is getting plenty of high grade gold and silver ore.

Another sack of samples is from the "Nigger Diggins," six miles west of Goldboro. The rock is high grade silver. According to Hidalgo the camp is showing better every day and in his opinion the camp and district will make good. One lot of samples is from an average of the vein, six feet wide. The country rock is largely rhyolite cut by seams and veins, some of the vein-filling being rhyolite-breccia and reddish quartz. Considerable oxidation has taken place and so far the shallow workings do not show any sulphide ore.

The fact that the country is largely rhyolite and trachyte has prejudiced some experts against the district, say the prospectors in the new camp, but they call attention to the fact that in the famous Chispas mine in Sonora of the Pedrazzini, which has made its owners millionaires, the country rock is rhyolitic with veins cutting it that are among the richest in Mexico.

It should also be noted that the geology of Tonopah district, Nevada, is complex; a series of volcanic rocks, partly lava flows, partly intrusive sheets and masses of quickly varying thickness overlying one another irregularly. The veins are fissures which for some distance lie on or in planes of contact between eruptive rock.

According to Walter Harvey Weed, "the Tonopah district is made up of a thick series of rhyolitic and andesitic rocks, which is faulted in a very intricate manner, together with the accompanying veins, and the Goldboro prospectors maintain that the formation of their district is made up of rhyolite, trachyte and andesite."

The Ruth property in the Lordsburg district has shown such improvement as to warrant continuing the work on a large scale in sinking, drifting and opening a new shaft. Frank G. Koerwer, manager, says the work to date shows 85 feet of sinking, and two drifts 50 feet on the 60-foot level. One hundred and thirty feet of development at this point, shows a width of four and a half feet of ore, the development being all the time in ore. Mr. Koerwer appears confident that the Ruth will become a big mine and will warrant the erection of a mill in the near future.

REVIEW OF UTAH MINING FOR 1921.

By Henry M. Adkinson.*

In the face of the present depressed metal markets, with the consequent inactivity in metal mining in Utah, it is interesting and instructive to examine Utah's record for mineral production. Other states have exceeded Utah in respect of single metals produced, but no other state has held so high a rank in all the metals. During the last four years, of all the states in the Union, Utah has ranked second in the production of silver; has ranked third in the production of lead; has ranked fourth in the output of copper; has ranked seventh and then sixth in the production of gold. In the combination and variation of metals produced no other state has approached Utah.

The attention of mine operators and mine investors should be directed to the pertinent facts named above, and

to the following illuminative details: Utah has less than one-half of one per cent of the population of the United States, but this insignificant number of people produce

One-fifth of the Nation's silver.

One-sixth of the National's lead.

One-eighth of the Nation's copper.

One-eighth of the Nation's potash.

One-tenth of the world supply of vanadium.

Utah has in the Utah Copper mine the largest copper mine in the world. Utah has the largest smelting capacity in the world in its assemblage of smelters at Salt Lake City—indicative of the mineral wealth abounding both in Utah and adjacent states. Since 1865 the whole of the United States has produced a total of seventy billions of dollars in mineral wealth, and one billion dollars of this has come from Utah.

These are highly important facts in the mineral industry, and in order to bring them more concisely to the attention of mine operators and mine investors the Commercial Club of Salt Lake City has collected and published a booklet of UTAH'S MINERAL WEALTH. The statistical work was done by U. S. Government men, and the facts are reliable.

With such a record in the past Utah looks with equanimity on the temporary reaction in mining caused by the depressed markets of the world. The low copper and lead markets have been the vital factors in the business drop of 1921. The stability of silver by virtue of the Pittman Act has been a saving feature of mining. The mines of Utah are in excellent condition as a result of the extensive development campaigns which have been carried on the past two years, and as soon as metal markets improve the same heavy tonnages of ore will pour forth as hitherto.

The restricted mining conditions in Utah are not merely local. These conditions have seriously affected the whole of the United States. Freight car loadings furnish now the best barometer of the physical volume of business. Judged by this standard we find that in the entire United States ore shipments in late October were only 18,209 cars, as contrasted with 68,039 cars in 1920 and 41,642 cars in the same period of 1919. The same ratio will hold for Utah. During 1921 the smelters in the Salt Lake valley, which are the largest in the world, have been operating at about 40 per cent of normal, and less than 30 per cent of capacity.

Most of the smelting comes from the lead ores and copper ores of Bingham, and from the silicious and lead ores of Tintic district. The Utah Copper, Utah Consolidated and Utah Apex mines of Bingham have all been closed because of the low price of both copper and lead. With the recent modest advance in copper, however, the Utah Copper Company has resumed work in a slight degree with a few steam shovels. The Utah Apex and Utah Consolidated companies are both ready to resume once the price of metals makes it possible. The United States Mining Company has employed a large force during the entire year and operated its mine at Bingham in order to keep its smelter supplied with ore in addition to the tonnage coming from ore producers marketing their output.

Men active in the mining business in Utah see unmistakable indications of a revived interest in metal mining. In my own office I have known of large New York companies sending their engineers into the field within the last few weeks.

Good prospects can be had now at bargain-counter prices and these are being quietly investigated and in many cases are being acquired by far-seeing investors. Conditions were never more favorable for attractive properties to be bought at attractive figures.

*Mining engineer, Salt Lake City, Utah, who wrote the article for the January issue of the Railroad Red Book.

Prospecting, Past, Present and Future.

By S. F. Hunt.

The present participle verb prospecting means, when applied as a term to mining, broadly, to survey and explore; with less latitude, to view or expect with reason to hope; and narrowly, to seek, search, look carefully and dig for veins and deposits of ore. Logically, it is a process of reasoning by induction from known facts and causes to possible and probable effects and results.

The curved shadow of the earth on the moon in eclipse, the washing ashore of two strange human bodies and other proven facts were the data presented to Ferdinand and Isabella by Columbus which finally induced them to outfit him with ships and sailors to explore for a short westward route to the rich trade of China and India, and which resulted in Columbus' discovery of the Americas. At that time the Atlantic was called the "Sea of Darkness" and until his return nobody knew positively that the earth was round, yet it had been proven inductively for a long time. If not all of them practically every great discovery and advance in science, mechanics, invention and human knowledge have been made by processes of inductive reasoning, or exploring from the known for the unknown. So prospecting is one of the primary processes of evolution and advance from a lower to a higher order of things; and those who accept the responsibilities and burdens of prospecting for the new things of worth, are the wheel-horses of human progress. They are the Atlases upon whose shoulders the world of others are borne.

The word prospect implies the idea of futurity—an outlook or expectation worthy of exploring. The explorer or prospector then is one who employs inductive principles in his processes and methods of bringing new things into use. He is a trail-blazer for those who follow and prosper from his sacrifice, work and discoveries.

The Earliest Prospectors.

Marco Polo, Christopher Columbus and John Cabot were explorers, which is the broadest sense in which prospecting for the unknown can be used. In the thirteenth century—1275—Marco Polo journeyed overland across the continent of Asia from Italy to China. He also went on to "Cipango" or Japan and discovered that country to the Europeans. Columbus crossed the "Sea of Darkness" four times in search of India, and finally died poor, broken-hearted and in disgrace, because he failed to find any mines and could not supply the Spanish king with gold. King Henry, the Seventh, consented to John Cabot's voyage to search for a short route to the "Spice Islands," in 1497, which resulted in Cabot's discovery of North America. He carried back to England some Indian traps, two wild turkeys and the rib of a whale, but no gold; so Henry and the English forgot about the New World for 100 years.

De Soto's daring expedition in 1539, traversed the south from Florida to the Mississippi river in search of gold mines. His expedition ended in failure and De Soto's body was buried in the muddy waters of the Mississippi, which he had discovered instead of gold.

After founding the first English settlement in America, in 1585, Sir Walter Raleigh was knighted by Queen Elizabeth. He introduced the use of tobacco and the raising of potatoes into Europe, but finding no gold he was thrown into prison by King James. After many years confinement he was released by this money-loving monarch and sent to South America to get gold. And when he returned to London without any gold, the king felt so put out about it, he condemned and beheaded poor old

Walter. In the vernacular, "he got it where the chicken got the axe," for failing to return with gold.

Daniel Boone built the "Wilderness Road" 200 miles long over the mountains of Tennessee into Kentucky and the Mississippi watershed. This was the first road for wagons to cross the Appalachian mountains. Boone died poor and old in Missouri, begging for a piece of land, yet he won his niche in the Hall of Fame. Captain Sutter, living like a prince where Sacramento now stands, owned 12,000 head of cattle and 10,000 head of sheep at the time his saw-mill man—Marshall—discovered gold on the American river, California, in 1848. Both Sutter and Marshall died penniless in a land of gold.

In the summer of 1807 20,000 people gathered on the banks of the Hudson river to laugh and jeer at "Fulton's Folly"—his Clermont steamboat. But the cry of wonder and astonishment which arose from that surprised throng—"she moves, she moves"—echoed around the world.

Again in 1844, after years of labor and privation, Samuel F. B. Morse, then a gray-haired old man, taught little Annie Ellsworth to send the first telegram from Baltimore to Washington—"What God hath wrought." The Congress that gave \$30,000 to construct his forty miles of telegraph lines, ridiculed his plan as being as fantastic as building "a railroad to the moon." And finally there has been some laughing and joking about Ford cars. Yet these great men were all prospectors and explorers in the field of science and applied mechanics.

The Present.

In our own time discovery and invention have crowded each other in the field of science and mechanics. The telephone, phonograph, moving picture photography, the automobile, the submarine boat, and the aeroplane are examples of modern developments. These and kindred devices have revolutionized the work of the world, and have largely supplanted the older, outdoor forms of exploratory effort.

The discovery of the South African and Alaskan gold-fields are the only two recent happenings or events that have started general stampedes and excitements. Tonopah, Goldfield and Cobalt, had their days of favor, fustian and noise, but hardly passed beyond local excitements. The big, low-grade copper developments have been the outstanding features of interest in modern mining. The magnitude of these operations being nothing short of wonderful, and the metallurgical processes evolved for the successful treatment of these ores, are quite as remarkable. Twenty years ago the idea of flotation was a nebulous possibility in the minds of half a dozen experimenters. During the last seven years millions of tons of ore have been successfully treated by this process, which could be handled in no other way.

But these accomplishments have brought the mining world to the end of a cycle. In the case of the big copper mines, when a ton of ore can be mined, transported by rail or train ten to thirty miles, milled and reduced to bullion for \$2.50 per ton, or for one tenth of the cost of producing a ton of potatoes, the margin of possible reductions of cost, in the future, are insignificant. And for the last twenty years all kinds of exploration parties and concerns have been trailing each other back and forth across the five continents and over the whole face of the habitable globe, in search of new districts and deposits of the precious metals. Not much territory now remains, prospectively,

undiscovered, for the surface globe-trotting prospector to work on. Yet this is the Golden Age of the scientist and explorer. They are to become the rich and powerful—the "Dollar a Year" men of the present.

The Future.

It is patent to all that mere roving around over the surface in search of mines, is wasting time. The outcrops have about all been discovered. There is nothing in it any more for anybody; so another direction is indicated. Now, there remains only two more directions to explore—the first is straight down and the second "straight up."

The rocky crust, in which veins and deposits of ore reside, is in most places covered with a heavy mantle of wash and soil. It is out of sight below the surface. There is no sense in prospecting the surface here. The only right and remaining way is to dig down—go down after the ore. Following this plan of exploration, not many new districts will be discovered, but a great number of new mines in old districts will be developed. The future production of the metals largely depends on this line of work, and the outlook is splendid.

Yet it is easier said than done, and it does not appeal to the imagination. The prospector and field man can ride and ramble around—and the going is fine—over a thousand miles of country in half the time and for half the expense of sinking a 100-foot prospect hole. It is going to hurt the prospectors and exploration concerns' feelings like hell to realize and admit they must begin to dig down. Their only alternative is in going straight up.

Going Straight Up.

Stock-taking on the old year, by January 15, 1922, will impress not a few that their holdover assets consist mainly of a bad cold. Yet, if this infirmity enables them to get an occasional wheeze, it may be after all not a very bad cold.

It is reported the planet Mars is the next new prospect field to explore—and some big propositions are said to be in sight. Astronomers believe, prospectively, there are great canals and rivers of water, broad stretches of fall timber, wide valleys of rank grass and grain, mountains of nickel, ridges of silver and gullies of gold up there. And that for 10,000 years the Martians have been shooting into space thousands of tons of nickel and meteorites to let their neighbors know what they have in stock to trade, and that they are out of gasoline and can't come down. The Martians want copper, iron, gas and snuff in exchange for their surplus nickel, silver, gold and yagwaddle (pronounced with a Swedish accent), a drink unknown on this planet since our mythic ancestors ran out of ambrosia.

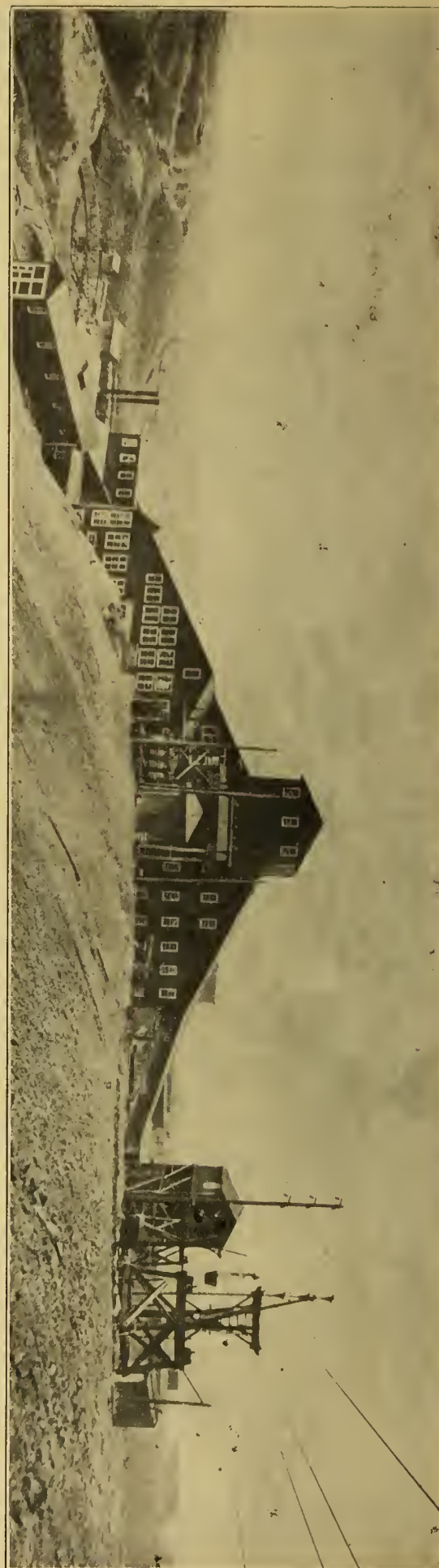
Even now a party of astronomers are on their way to South America to erect a great telescope to look up good landing grounds for the degravitated etherboats which must be built to cross the new "Sea of Darkness," rolling between Earth and Mars. Some of these ships may be lost in space, but it should take no longer time to make the trip than it did Columbus to cross the Atlantic.

John has the gas; now where are the Ferdinands and Isabellas to grubstake a crew of flyupskies for the voyage to Mars? There will be butinskys who will want to go on day's pay, but there is one volunteer who will be glad to make the trip for one drink of yagwaddle.

For 1922 the world wants a new ambition, a new sensation, a new star of hope and something new to talk about. It needs—an outlook to lift the stolid pall of sameness which hangs about, like the cold rings of Saturn, and hovers above like the dense fogs of Neptune—a drink of yagwaddle from the fountain of change, to cheer it up.

"Les go."

View of the New Pneumatic Flotation Plant of the Utah Consolidated Mining Company, at Tootle, Utah, Ready for Commissioning. Designed and built by the General Engineering Company, of Salt Lake City, Utah.



HISTORICAL NOTES ON BINGHAM CAMP AND DEVELOPMENT OF U. S. PROPERTIES

By J. Fewson Smith E. M.*

The West Mountain mining district, Utah, in which the Bingham properties of the United States Smelting, Refining & Mining Company are situated, is the oldest in the state. It was organized in December, 1863, and has the distinction of having supplied the first ore for shipment and included the first smelter to operate within the confines of Utah.

Ore was first discovered in September, 1863, upon property now owned by the United States Smelting, Refining & Mining Company, and thenceforth mining operations were conducted unceasingly, but under restrictions and adversities which retarded progress and limited output and development up to the year 1897.

The beginning of real achievements in the district dates back to the four-year period from 1897 to 1901. This period was characterized by consolidation of large tracts of mining property under individual companies, and by very extensive underground exploration of the larger companies. The zones of oxidized ore had been pretty well worked out and the development of the sulphide ores and adequate methods of treatment were about to begin and thenceforth continue.

Organization of U. S. Mining Company.

The United States Mining Company was an outgrowth of this four-year epochal period. The company was organized in March of 1899, and was the culminating effort at consolidating three of the most prominent and productive mining areas of the district. The Telegraph group of the Conglomerate Mining Co., the Spanish group of the Niagara Mining Co., and the Old Jordan and Galena group of our Mr. Holden's company were taken over; at the same time the smelting property at Midvale (then Bingham Junction) was acquired.

The consolidated property of the new company reached from the head of Yosemite gulch in Salt Lake valley to the northerly slopes of West Mountain, a distance in excess of two miles. It embraced nearly five hundred acres of patented ground, and in addition, many mining locations which have since been surveyed and passed to patent. The great Jordan limestone lode and portions of the commercial limestone bed, together with ten of the geologically great fissures of the region were embraced in the formations covered by the property. Together these twelve structural members had furnished more than twenty million dollars in metal values at the date of consolidation.

The exploratory work of the United States company since 1899 has proven them to be a combination of the most prolific of ore bearing geological formations in the west, and the output in tons and aggregate value of metals for the period since 1899 has gone far beyond the record of previous years.

Development of the Jordan Limestone.

Up to date the mines have been in operation for 57 years. In the aggregate 58 miles of drifting, sinking and raising for the development of ore have been accomplished. Some of the fissures have been developed on the surface and underground along the strike for 8,000 feet, and the Jordan limestone lode has been mined without a break from the easterly end of the company's property to the westerly end of the Jordan claim, a distance in excess of ten thousand feet.

It is not possible, at this date, to place any limit upon

the life of the mines. Thus far, in 57 years, the maximum depth attained upon any of the ore bearing formations is less than 950 feet below the surface, and there yet remains fully 25 per cent of the most promising areas in both the limestone and the fissure on and above the Niagara tunnel level to be prospected and developed.

The Niagara tunnel, at an altitude of 6,650 feet, is the lowest level and main outlet tunnel from the property. All of the ore from the mine is delivered through this tunnel to the railroad cars at its mouth, and practically all supplies for the mine are conveyed back through it. The Bingham and Garfield railroad receives the ore direct from the mine cars which are run in on a narrow track over a siding near the portal of the tunnel, and the power plant supplying the entire property is also located at this point.

Future Development.

Conditions are very favorable for the future development of the property to a depth of 100 feet below the Niagara level. At this depth the Mascott tunnel of the Ohio Copper Company has reached a point less than 500 feet from our lines, and can be made use of for the deeper development of our mines, if we see fit to use it.

In all cases the ore chutes which have been followed down to the Niagara level are strong enough to warrant faith in their continuation to the depth of the Mascott tunnel; in fact, the adjacent property north of us has been mining ore for 2400 feet down from the surface to a point 300 feet below the Mascott level, and there is no good reason to think that we will be less fortunate.

We have recently started a new 3-compartment shaft from the Niagara tunnel level which is now down about 250 feet, but no stopping has yet been done. This is the beginning of the deeper development of the mine, and whether it be accomplished eventually by means of the shaft or the Mascott tunnel, conditions are all propitious for a further long life at Bingham.

Early History.

There are many features of historic interest connected with the Bingham properties which might be admissible if there is space. The West Jordan claim of the Jordan and Galena group is not only the oldest claim in the district, but is also the first one of record in the state, and the longest that has been located. It was located upon the Jordan limestone September 17, 1863, and covers that member of the formation in the most advantageous way for a distance of 5,200 feet, or nearly one mile of length. No skill of the modern expert could have accomplished a more satisfactory location of a great lode than did the rude miners who placed the Jordan claim. It was upon this claim, in the close neighborhood of the company's Bingham offices that both mining and smelting were, initiated in Utah in 1863 and 1871, respectively.

The Jordan tunnel, run at a cost of \$60 per foot, was the first piece of actual mining, and the Utah smelter, with its excessive costs and losses, was the first attempt at smelting.

The Galena claim, another piece of the company's property, was located in January, 1864, on the Galena fissure. This was the first location on the fissure systems of the district. Today, after 57 years of continuous production, the Galena fissure is furnishing a regular quota of marketable ore from different places along its strike through company property, and the descending ore faces at the Niagara tunnel level are as persistent and rich as at any of the places where they have been worked above.

The early work of consolidating and the later development of these old Bingham bonanzas devolved largely upon our Mr. Holden. His superb faith in the structural features, at the time when most of the mine operators of Bingham considered the Bingham formation superficial and doubtful, has redounded in credit to himself and profit to his company.

*In the November issue of Ax-I-Dent-Ax, a "safety first" monthly published by and for the employees of the United States Smelting, Refining and Mining Company.

Personal Mention

Chas. Peter, general manager of the Mascot Consolidated, left on the 4th instant to visit the company's big Idaho mining properties.

C. A. Johnson, assayer at the Leadville mine north of Gerlach, was in Reno for the holidays en route to the Simon mine, where he has accepted a similar position.

John M. Hayes, formerly treasurer for the Utah Copper Co., has returned to Los Angeles after a month's trip to Panama, Havana, and New York.

After nearly sixteen years of continuous service for the same interests, Henry A. Tobelman, metallurgist for the New Cornelia Copper has resigned to accept a position in New York.

William Loeb, Jr., vice president of the American Smelting and Refining Company, arrived in Salt Lake recently on one of his regular trips of inspection of the corporation's plants.

E. R. Ramsey, of the Dorr Company, is visiting the property of the Volcano Mines Company near Steins, N. M., in connection with a proposed new milling and cyanide plant.

Prof. F. W. Speer, of the Michigan College of Mines, consulting engineer of the Bureau of Mines, assisted by R. V. Ageton, is making a study of ground movements in the deep copper mines of the Lake Superior district.

D. C. Dunbar and Mrs. Dunbar left for Birmingham, Ala., a few days ago. Mr. Dunbar will attend the sales convention of the American Cast Iron Pipe Co., which he represents in this field, during his absence of about sixty days.

Charles A. Smith, superintendent of mines at the Ray Consolidated in Arizona, one of the quartet of the Jackling porphyries, was in Salt Lake, the guest of L. S. Cates, general manager of the Ray Consolidated and assistant general manager of the Utah Copper Company, early in the month.

H. Badt, general manager of the Spruce Monarch Company's mines, out of Battle Mountain, Nevada, was a Salt Lake visitor two weeks ago. The company has been shipping about four carloads of ore a month, but hauling had ceased when Mr. Badt was here waiting for the soft roads to freeze up. The last car shipped netted about \$2,200.

Mr. Atsumi, in charge of several important collieries for the Mitsui Company, of Japan, recently completed a trip of observation through the coal fields of England, France and the United States. Early in the present month, accompanied by D. S. Allison, field expert for the Sullivan Machinery Co., the visitor made a trip of inspection to the Utah coal mines in Carbon county.

NATION'S COPPER, LEAD AND ZINC.

The geological survey estimates the total new supply of primary refined copper for the year 1921 was about 989,000,000 pounds, which includes refined copper production from foreign and domestic material as well as imported refined copper. The stocks of refined copper in the hands of domestic refineries on December 31, 1921, excluding those in transit, as estimated by the refining companies, were about 496,000,000 pounds. The stocks of blister copper on December 31, 1921, including material in process, in the hands of smelters, in transit to refineries and at

refineries, were estimated by refining and smelting companies at about 297,000,000 pounds.

The quantity of primary refined copper withdrawn on domestic account during the year was about 572,000,000 pounds, against 1,054,000,000 pounds withdrawn in 1920.

The mine and smelter output of lead in the United States in 1921 each fell off about 20 per cent and the mine and smelter output of zinc each declined nearly 60 per cent.

Utah made an output of about 45,000 tons of lead, a decrease from 70,419 tons in 1920.

The recoverable zinc content of ore mined in 1921 was about 250,000 tons; compared with 584,772 tons the year before, and 549,242 tons in 1919. The output of the eastern states was about 68,000 tons, that of the central states about 168,000 tons and of the western states about 14,000 tons, compared with 102,242, 347,652 and 144,878, respectively, in 1920.

Imports of zinc in ore decreased from 22,487 tons in 1920 to about 2,700 in 1921, most of which came from Mexico.

HARMONY MINE RESUMES

Salmon, Ida., Jan. 10.—After a quiescent period of about 14 months, the Harmony mine near this city has resumed operation and production. This property has several good veins of copper sulphide ore, extensively developed, and in the past has shipped a considerable quantity of ore and concentrate to market. Manager E. F. Nieman of that property says that teams are already delivering stock concentrates to the railroad station, that miners are being set at work, and that the 100-ton concentrating plant will be operated at capacity by the end of this month. By that time the company will be employing some 50 men. The price of copper is still quite low, but officials of the Harmony Company believe it possible to operate under present conditions at a narrow margin of profit, which they deem preferable to a continued shutdown.

OIL MEN GET RELIEF

On the 5th instant the United States senate passed the bill which had previously received favorable consideration in the house, which was introduced for the purpose of affording relief to people who had been securing oil land lease permits under the act of February 25, 1920. The amendment becomes a law ten days after passage whether signed by the President or not. Thousands of locations had been made in Utah and surrounding states by individuals and companies who, by reason of tight money conditions have been unable to meet the requirements of the law with respect to beginning drilling operations and completing work in the periods prescribed by the law.

The amendment which has just become law will relieve the situation materially by making it possible to obtain extensions of time through making proper representations to the secretary of the interior. The amendment to the law which now is in effect reads as follows:

"That the secretary of the interior may, if he so finds that any oil or gas permittee has been unable, with the exercise of diligence, to begin drilling operations, or to drill wells of the depth and within the time prescribed by section 13 of the act of congress approved February 24, 1920, extend the time for beginning such drilling or completing it to the amount specified in the act for such time not exceeding three years, and upon such conditions as he shall prescribe."

United States Smelting, Refining and Mining Company

Buyers of

Ores and Concentrates Matte and Furnace Products

Terms quoted for smelting ores, also for concentrating ores containing low percentages of both lead and zinc, on application to the United States Smelting, Refining and Mining Company, Newhouse Bldg., Salt Lake City. Smelter and lead and zinc concentrating and separating mills at Midvale, Utah; Copper smelter at Kennet, California; Zinc smelter at Checotah, Oklahoma; Lead refinery at Grasselli, Indiana.

*Insecticides, Fungicides, Weed Killer, Poison Bait, For Sale by Our
Agricultural Department. Newhouse Building, Salt Lake City, Utah.*

SALT LAKE MINING STOCK QUOTATIONS

The range of the market from December 27th, to January 7th, inclusive, Quotations furnished by J. A. Hogle & Co., direct wires to all leading markets, 169 So. Main St., Salt Lake City, Utah, and ground floor of Eccles Building, Ogden, Utah, and Pocatello, Idaho.

Stock.	CLOSING						Sales.	Stock.	CLOSING						Sales.
	Open.	High.	Low.	L. S.	Bid.	Asked.			Open.	High.	Low.	L. S.	Bid.	Asked.	
Alta Mich.						.05	500	Keystone					.12	.50	1,000
Antelope Star						.08	6,000	Kennebec	.05	.05	.05	.05	.04	.08	2,800
Alta Con.	.04	.05	.04	.05	.05	.01	1,000	Lehi Tin.	.01	.01	.01	.01	.01	.01	9,000
Alta Tiger						.01	500	Leonora	.01	.01	.01	.01	.01	.01	12,000
Amer. C. Mns.						.06	500	Lynn Big Six	.08	.16	.08	.16	.16	.35	1,000
Albion Cons.	.07	.07	.07	.07	.07	.12	4,000	Monzonite					.10	.35	2,000
Am. C. Cop.						.01	29,500	Mammoth					.01	.02	54,562
Alta Tun.	.12	.17	.12	.16	.16	.17	1,000	May Day					1.50	2.00	37,500
Bullion	.01	.01	.01	.01	.01	.02	1,000	Mason Valley					.29	.30	6,000
Big Hill						.01	1,000	Mich. Utah	.17	.30	.17	.29	.05	.05	7,000
Big Cot Coal	.05	.05	.05	.05	.05	.04	1,000	New Quincy	.04	.05	.04	.05	.05	.05	1,000
Beaver Cop.						.02	1,000	Naildriver					.05	.20	6,000
Bay State						.01	1,000	No. Standard	.03	.04	.03	.04	.04	.05	1,000
Black Metals						.06	1,000	O. K. Silver					.1	.02	1,000
Bing. Gal.	.01	.01	.01	.01	.01	.01	148,000	Cphongo					.10	.20	3,750
Cent. Eureka						.02	1,000	Original Ban.					.12	.20	1,000
Cedar Talis.						.02	1,000	Ohio Copper					.11	.12	2,000
Colb. Rexall						.12	1,000	Plutus					.12	.20	3,750
Colo. Con.	.04	.08	.04	.05	.04	.04	13,500	Prince Con.	.07	.11	.07	.11	.11	.12	1,000
Crown Point						.02	1,000	Pioche Brst.					.05	.05	2,000
Cardiff						.95	1,000	Price Mining	.05	.05	.05	.05	.04	.05	3,000
Croff						1.00	3,000	Provo	.01	.02	.01	.02	.01	.02	7,000
Daly	2.00	2.00	2.00	2.00	1.40	.02	50	Rds. Pk. Cons.					.10	.14	9,000
Daly West						.02	34,600	So. Standard	.03	.03	.03	.03	.03	.04	1,800
Dragon						.01	1,000	Sells					2.27	2.30	1,875
Emma Sil.	.01	.01	.01	.01	.01	.01	1,000	Syndicate					.54	.60	4,050
Empire Mns.						.02	1,000	Sil. King C.	2.05	2.32	2.05	2.30	.01	.02	5,000
East. Prince						2.25	1,000	Sil. King Con.	.52	.54	.49	.52	.01	.02	5,000
E. & B. Bell						.05	1,000	Sioux Mns.	.02	.02	.01	.01	.01	.03	1,000
Emerald						.04	1,000	Swansea Con.					.13	.01	5,000
Eureka Mns.	.04	.05	.04	.04	.04	.05	10,000	So. Hecla					.01	.01	5,000
E. Crown Pt.	.02	.02	.02	.02	.02	.02	2,500	Silver Shield	.01	.01	.01	.01	.01	.01	5,000
E. Tin Coal		.01		.01		.01	6,000	Tecoma					.01	.02	5,500
E. Tin. Con.						.06	1,000	Tar Baby	.02	.02	.02	.02	.01	.02	5,000
East Ant.						.09	2,000	Tin. Central	.01	.01	.01	.01	.01	.01	3,484
Eureka Lily	.07	.07	.07	.07	.07	.09	16,200	Tin. Standard	1.87	2.00	1.80	2.00	.01	.01	1,000
Eureka Bul.	.02	.03	.02	.02	.02	.03	500	Uncle Sam					.01	.01	1,000
Gold Chain	.04	.04	.04	.04	.04	.35	500	Union Chief					.01	.01	1,000
Grand Cent.						.50	1,000	Victor Con.					.01	.01	2,797
Ham. Mns.						.03	6,677	Victor Mng.					.02	.02	150
Howell	.05	.05	.05	.05	.03	.05	5,800	West Toledo	.02	.02	.02	.02	.02	.02	2,800
Home Run	.43	.53	.28	.28	.17	.20	500	Walker Mng.	2.75	2.75	2.75	2.75	2.62	3.00	1,000
Iron Blossom						.08	500	Woodlawn	.06	.08	.06	.08	.08	.10	2,800
Indian Queen						.08	500	Yankee Con.					.01	.01	3,500
Iron King	.10	.10	.10	.10	.10	2.10	3,000	Zuma	.03	.04	.03	.04	.04	.04	1,000
Judge M. & S.						3.00	100								

HIGH AND LOW QUOTATIONS AND TOTAL SALES MADE ON SALT LAKE MINING AND STOCK EXCHANGE DURING 1921.

Compiled by Secretary Horace V. Altree.

NAME OF STOCK	High.	Low.	Tot sales	NAME OF STOCK	High.	Low.	Tot sales
Alta Michigan	.02	.01	13,000	Keno	.00	.00	3,000
Antelope Star	.06	.00	384,200	Kennebec	.08	.05	19,000
Alta Con.	.04	.00	199,900	Lehi Tintic	.12	.01	425,300
Alta Tiger	.00	.00	22,500	Leonora	.03	.01	382,000
Albion	.14	.03	119,400	Logger	.01	.00	74,000
American Con. Mines	.07	.01	49,500	Lynn Big Six	.10	.03	67,500
Alta Tunnel & Trans.	.14	.02	681,200	Monzonite	.02	.00	245,000
American Metal	.01	.00	101,500	Mammoth	.35	.35	100
Addie	.02	.02	2,000	Miller Hill	.05	.01	33,500
Bullion	.08	.01	238,500	May Day	.02	.00	105,900
Boley	.01	.00	14,000	Michigan-Utah	.28	.00	697,500
Big Hill	.04	.01	72,200	New Quincy	.12	.03	1,598,000
Big Cot. Coalition	.04	.01	72,200	Naildriver	.35	.20	1,700
Beaver Copper	.05	.00	396,200	Neva	.00	.00	2,000
Bay State	.01	.01	265,400	North Standard	.08	.01	830,800
Black Metals	.13	.01	77,200	O. K. Silver	.05	.00	39,000
Bingham Galena	.38	.01	1,482,700	Old Emery	.21	.20	74,500
Bell Silver	.63		33,500	Opohongo	.00	.00	13,500
Central Eureka	.01	.01	23,000	Original Bannock	.00	.00	14,000
Cedar Talis.	.01	.00	25,500	Pioche Bristol	.06	.00	2,194,000
Columbus Rexall	.42	.10	203,100	Plutus	.31	.15	44,600
Colorado Con.	.08	.01	24,900	Prince Con.	.38	.05	656,500
Crown Point	.03	.01	65,800	Paloma	.02	.00	90,500
Cardiff	1.30	.82	22,400	Price Mining	.06	.02	77,500
Croff	.02	.00	84,500	Provo	.06	.00	56,000
Cottonwood Metals	.00	.00	2,000	Rico Argentine	.03	.00	7,000
Daly West	4.10	1.60	700	Reeds Peak	.01	.01	4,500
Daly	2.50	1.50	500	Rico Wellington	.05	.01	23,000
Dragon	.04	.04	1,000	South Standard	.16	.10	43,000
Demijohn Con.	.01	.00	90,500	Sells	.07	.01	365,300
Empire Mines	.05	.02	13,000	Syndicate	.00	.00	177,000
Empire Copper	.06	.05	7,000	Silver King Coalition	2.50	1.50	77,600
Eastern Prince	.00	.00	1,000	Silver King Con.	1.00	.39	75,900
Emerald	.13	.01	14,500	Sioux Con.	.02	.01	8,100
Eureka Mines	.13	.03	192,500	Swansea Con.	.02	.01	4,000
Emma Silver	.03	.00	448,800	South Hecla	1.15	.20	21,700
E. Crown Point	.02	.01	178,900	Silver Shield	.32	.01	480,600
East Tin. Con.	.12	.06	64,000	South Hecla Ext.	.02	.00	15,000
East. Antelope	.00	.00	1,000	South Park	.02	.00	15,000
Eureka Lily	.13	.06	504,800	Tecoma	.01	.00	33,000
Eureka Bullion	.16	.02	776,500	Tar Baby	.04	.00	326,000
E. Tintic Coalition	.01	.00	212,500	Tintic Central	.02	.00	27,000
Grand Central	.41	.35	800	Tintic Standard	3.42	1.60	269,700
Great Western	.04	.03	4,000	Uncle Sam	.00	.00	8,400
Galena	.03	.01	35,000	Utah Con.	.02	.00	32,000
Hamburg	.02	.01	9,000	Union Chief	.03	.02	12,000
Howell	.12	.03	177,600	Victor Mining	.03	.01	19,000
Home Run	.02	.01	23,500	Whirlwind	.01	.00	50,500
Iron Blossom	.53	.12	53,900	West Toledo	.05	.00	189,500
Indian Queen	.00	.00	12,500	Walker Mining	2.92	2.00	27,600
Iron King	.19	.06	61,500	Woodlawn	.18	.05	166,100
Judge M. & S.	3.00	2.50	500	Yankee Con.	.01	.01	6,000
Keystone	.55	.55	100	Zuma	.09	.02	142,800

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Present Conditions and Future Outlook For the Consolidated Mascot Mines Property

Very recent developments at the Consolidated Mascot Mines Corporation's properties on the east fork of Woodriver, about twenty miles from Hailey, in Blaine county, Idaho, are beginning to attract wide attention in mining circles. In fact, the impression already prevails that disclosures altogether out of the ordinary are taking place, and this impression is emphasized as a result of the frequent visits to the mines by General Manager Charles Peter who, when closely questioned earlier in the month, reluctantly admitted that he might have good news to impart a little later—"but not now." Only two weeks ago Manager Peter left for the mines accompanied by J. J. Beeson, the well known mining geologist, and D. J. Cook, one of the best known mining superintendents in the west, who has been named as mine superintendent and who now is in active charge of operations.

The affairs of the Consolidated Mascot Mines Corporation which only a few months ago was formed for the purpose of taking over all of the properties of the Mascot Mining & Milling Company, have been moving rapidly—so rapidly that the first objective of the development campaign now being energetically pressed is admittedly close at hand. The main, deep operating tunnel—the Lydia—is now a distance of approximately 1000 feet. This big operating tunnel is being advanced with two shifts and a third shift will shortly be added.

The east drift in No. 2 fissure was in a distance of 260 feet from the tunnel highway on the 15th, while the drift in No. 1 fissure was reported at 190 feet on the same date. It was impossible to get a statement from Manager Peter to that effect, but the belief is prevalent that the drift in the No. 2 fissure is giving unmistakable evidence that the expected ore shoot—which shows so big and rich in old workings near the surface, is certain to be encountered within the next 200 feet, as originally estimated.

In order that no delays in the prosecution of this work

should be met with, a perfect ventilating system was recently installed and placed in commission. A large Numa rock-drill sharpener was also added to the shop equipment, which previously included a large air compressor for the operation of power drills, together with complete blacksmithing and carpenter shop tools and materials.

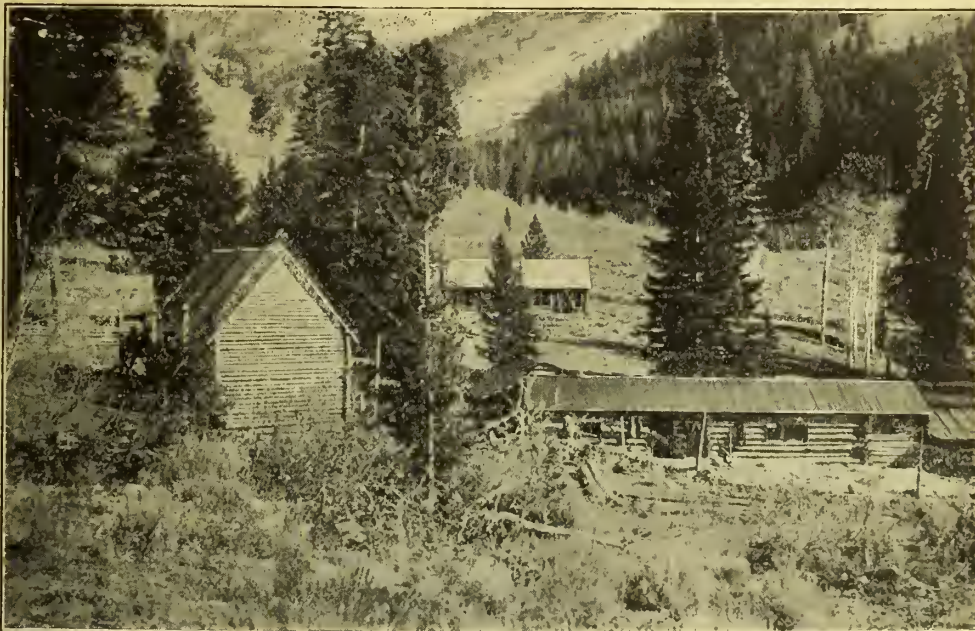
Now that it has been explained how and under what conditions this splendidly rounded out mining enterprise is approaching its period of steady ore production and dividend earnings, it will not be amiss to go back into the history of the undertaking and briefly sketch or review the accomplishments of the man who took hold of the proposition several years ago and who, practically single-handed—

and at times under most trying and discouraging conditions—has finally brought the proposition to a stage where there is nothing to hinder the major determination, which has ever been to give to the world another great mine.

In other words, when Charles Peter first took hold of the proposition, some seven years ago, and after he had become absolutely convinced that he had secured properties in which the veins were richly endowed with commercial deposits of silver, lead, gold, copper and zinc, he

vowed he would never quit until his judgment should be vindicated and that he could never be classed with the "quitters."

It should be stated here that the property of the Consolidated Mascot Mines Corporation comprises four patented and twenty-one unpatented lode mining claims, embracing approximately 1000 acres, (see accompanying map) in the Warm Springs mining district, Blaine county, Idaho. It is situated about twenty-two miles north of Hailey, the chief town of the county, and about twelve miles from Gimlet, a siding and station on the Ketchum branch of the Oregon Short Line railroad; the entire locality being environed by the boundary lines of the Sawtooth National Forest reserve.



View of some of the surface buildings of the Mascot. Manager's office, Power house, Boarding and Bunk house. New superintendent's dwelling in the background

The patented claims are known as the Oregonian, Silver Fortune, Snow Clad and the P. K. The twenty-one unpatented claims have all been surveyed for patent and the possessory title is perfect.

From Hailey to the mines is only about an hour's drive by automobile over a road which, for the most of the way, is a natural boulevard. From Gimlet, the loading station, the

lations, together with site for a large mill and an adequate power plant—one that would meet all requirements when the day arrived to begin outputting on an extensive scale.

Through shipments of rich ores made by previous owners from comparatively shallow workings, and through additional work performed at the instigation of General Manager Peter, not only has much additional ore been placed in sight, but



View Showing Physical Appearance of Country Embracing Western Portion of Company's Large Group of Claims

company's predecessors built a road to the mines which now is all that can be desired for either light or heavy transportation by automobile, truck or wagon.

Between the Mascot properties and Gimlet is located the North Star mines and big milling plant of that company, which is a subsidiary of the Federal Mining & Smelting Company, one of the largest, if not the largest, mining, milling and smelting concern in Idaho, or the west, for that matter.

accurate knowledge was acquired concerning the character, dip and trend of the various ledges that traverse the property.

All of this work, requiring years of time, study and expenditure of money has pointed unerringly to the course of permanent development and the location of the permanent operating tunnel and the tapping of the ore-bearing fissure system at an additional depth of 600 to 1800 feet. On the opposite side of the canyon, where most of the unpatented ground is located, all of the work performed gives unchallengeable evi-



Site of Main Operating (Lydia) Tunnel, Showing Clearing in the Timber Where Milling Plant is to be Erected

Following the early disclosures and development of fine bodies of ore in what are now the patented claims of the company Mr. Peter began the task of having the geology and vein systems of not only the chief claims, but the entire region now embraced in the large mineral estate worked out to a degree that established the great potential value of the ground. This work made it possible to carry on exploration and development along lines that could be utilized in finally fixing the location of permanent workings and camp instal-

dence that this particular ground will produce tremendous amounts of commercially valuable ore for years and years to come.

At various times in the past, Mr. Peter has had the properties examined and passed upon by such well known and reputable engineers as E. R. Zalinski, of Salt Lake, an engineer whose counsel and expert advice is constantly sought by the largest operating companies in this country; by Robert N. Bell, for many years state mine inspector of Idaho; and lately

by Harold A. Linke, who has just completed professional work in Mexico. These eminent authorities have been a unit in passing favorable judgment on these properties.

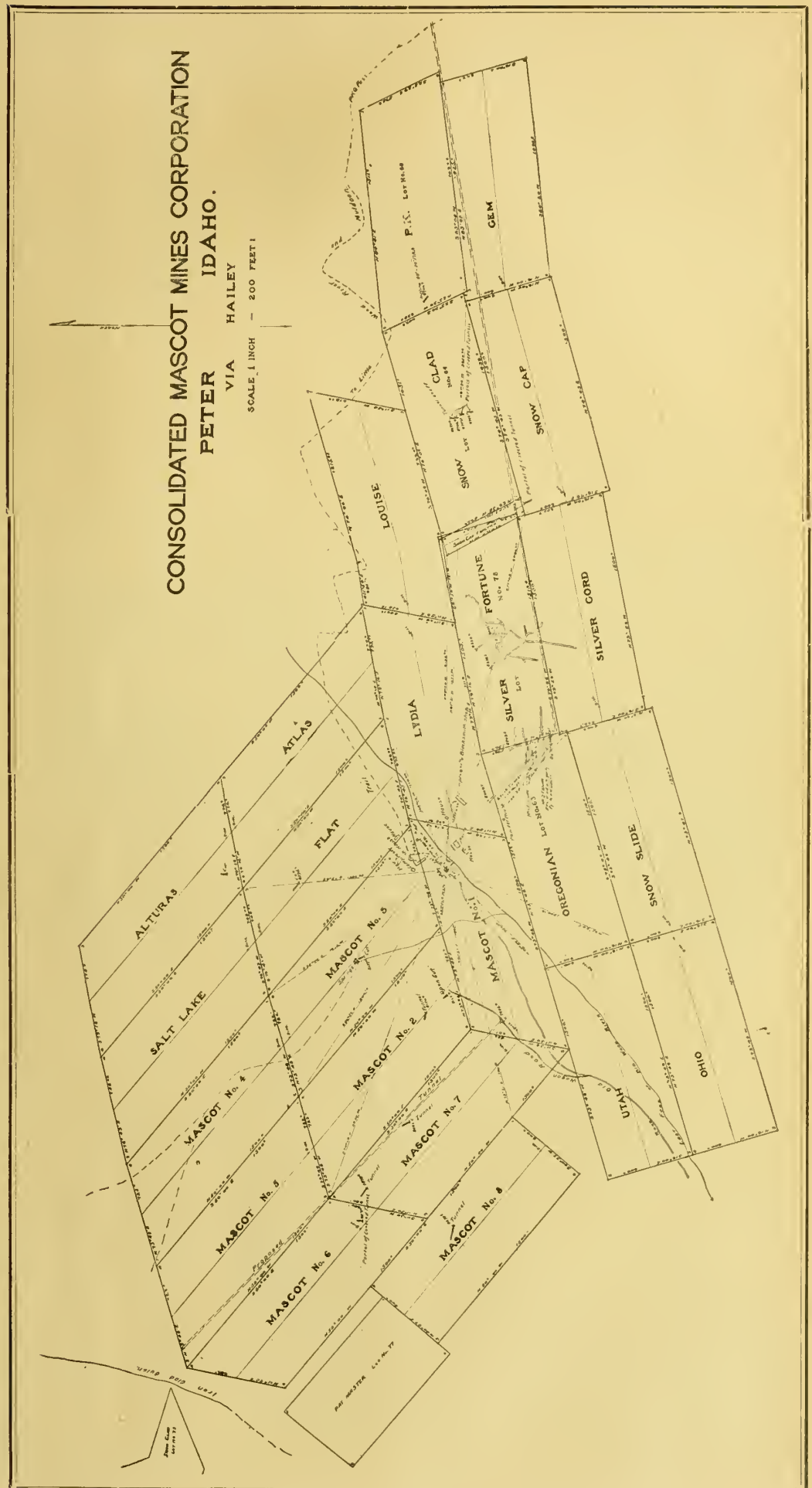
For the benefit of those who have recently become identified with and who have fallen heir to this magnificent mining estate as a result of the organization of the Consolidated Mascot Mines Corporation by Mr. Peter, and backed by powerful financial eastern associates, it seems pertinent to here introduce the summary and conclusions reached by Engineer Linke when his report on the properties was submitted. He says:

"The primary minerals are accessions from intrusive rock carried through the fissures by ascending solutions. Due to comparatively recent ground movement fissuring and shattering has taken place, resulting in the formation of minute cracks and crevices through which the downward percolating waters have carried the minerals leached from the upper zone; and redeposition of these minerals on the primary ores and in the country rock forms the zone of secondary sulphide enrichment. Due to the porosity of the rock these descending waters may carry their mineral burden to considerable depth. However, the country rock being a precipitant, mineral values are precipitated in the rock in the whole downward course of the solutions.

"I am of the opinion that the Lydia tunnel is in the upper part of the enriched zone."

"Conclusion.—I consider the location of the Lydia tunnel to have been particularly well selected for exploration at depth of the Oregonian, Silver Fortune, Snow Clad and P. K. ground. If hoped-for enrichment be not encountered in the first mentioned, it is likely to be as progress is made toward the east under the Silver Fortune, etc., for the further the advance in this direction the greater is the vertical depth attained. At any rate, rich veins of primary ore will undoubtedly be encountered along with the lower grade bodies of silver-lead-zinc milling ores, the latter depending upon the extent of enrichment.

"It is said that the North Star mine is in the same geological horizon as the Mascot. Valuable ores in that mine, and in the Independence mine, adjoining, are found at considerable depths.



"In milling the ores there will undoubtedly be several metallurgical problems to solve, but it is safe to say that none will be insurmountable."

"The east drift on the Oregonian vein ought to be advanced as rapidly as possible in order to open up the probable ore ahead of the present face."

"The main tunnel ought to be pushed at all possible speed and at minimum cost."

"The property is an exceedingly promising one and an active campaign of exploration and development is well warranted. I do not recommend mining the high-grade ore from the Silver Fortune workings at present, for the reason that it will be a costly matter to transport the ore down the hill to the road. In a short time, when the Lydia tunnel cuts through this body of ore at depth and it is developed on the Lydia level, the whole body may be mined and milled."

Surface Improvements.

In addition to the shaft house on the Silver Fortune claim and the structures at the mouth of the Perkins tunnel, etc., ample provision has been made for the comfortable housing of men, animals, supplies and machinery. Owing to the fact that a large portion of the property is covered by heavy stands of spruce and pine timber, the value of which to the company is probably greatly in excess of \$50,000, all structural improvements have been made of logs cut on the ground. Some of these buildings are shown in accompanying photographs, while some of the buildings have been erected since these photos were taken.

At and near the portal of the big (Lydia) operating tunnel, one building 30x100 feet, together with blacksmith shop, change rooms, etc., have been constructed. Across the stream, below the tunnel and millsite, homes for miners, with families, have been built. One of these is 22x50 feet, containing three rooms, while others are 25x60 feet and contain two commodious rooms. There also is a commodious manager's office, superintendent's home, power house, boarding and bunk house, a compressor house and machine shop 25x60 feet, carpenter shop, timber sheds, etc. Taken in their entirety these improvements represent a large outlay and they constitute a camp in which working and living conditions seemingly leave nothing to be desired.

But General Manager Peter is not content to stop here. He fully senses the future importance of the enterprise and the necessity that must soon exist for the community interests of the camp, if the greatest efficiency and well-being of the company's employees is to be realized. He plans making the camp of Peter one of the most healthful and pleasant places in which to live and make life worth the living. Here Nature has contributed almost every charm—beautiful scenery, magnificent forests, sparkling, cold mountain streams and a delightful, invigorating climate. It is the set purpose, therefore, to provide this ideal spot with a large, commodious community hall for social and amusement purposes. This building, as planned by Mr. Peter, will contain a music room, library, dancing floor, pool hall and conveniences for theatrical entertainment, moving pictures, lectures, religious services, etc. A school building also will be erected, while a bath house, barber shop, general store and other community conveniences are included in the plans now being figured out, including the establishment of a postoffice. So that, as the enterprise develops, the town of Peter will be counted as a most desirable place in which to live.

The camp already is provided with an adequate supply of pure spring water. This is piped down the mountain side for a distance of 1000 feet and is then piped into the various buildings where required.

The camp also is connected up with the outside world by the company's complete telephone system, nine miles long, and connecting with the Mountain States T. & T. company's system at the North Star property. Private wires also connect the various mine workings with the power house, office, boarding house, etc., to the great convenience and advantage of every department.

No attempt has been made in this necessarily short review of the properties and conditions surrounding the Consolidated Mascot's great mining enterprise, to discuss and explain details relating to the thousands of feet of mine workings, ore exposures, etc. These must come through detailed reports of the management as the years go by. But the map of the property; the picture showing the portal of the main operating tunnel; the clearing of timber in the foreground upon which a big milling plant is to be erected; the picture showing some of the buildings of the camp, and the other picture showing the nature and lay of the ground on which a half dozen of the company's claims are located—must suffice at this time.

The western mining world doffs its hat to General Manager Charles Peter for the manner in which he has handled this proposition from the beginning—and for a large portion of the time under most trying, discouraging circumstances—and it congratulates those now interested with him on being able to join in an undertaking that has been so splendidly rounded out for them.

STANDARDIZATION OF MINING EQUIPMENT

Every mine operator and engineer that is interested in standardization of mining equipment, or in improving the methods and practices in mining will find a great deal of interest in the Second Standardization Bulletin just published by the standardization division of the American Mining Congress, Washington, D. C.

It contains the recommendations of the committee from the coal and metal branches. These committees are composed of mining operators, engineers, and manufacturers. Thus, by having the views of both operators, engineers and manufacturers, the recommendations have been thoroughly considered from all sides. The bulletin also contains the discussions of the reports which were presented at the Second National Standardization Conference held in Chicago, October 17th to 22, 1921.

The bulletin contains reports and recommendations of the following committees of the coal mining branch: Underground Transportation, C. E. Watts, chairman; Main Drainage, E. D. Knight, chairman; Outside Coal Handling Equipment, Henry Mace Payne, chairman; Joint Report, by the Underground Power Transmission, A. B. Kiser, chairman; and Power Equipment, K. A. Pauly, chairman.

The following committee of the metal mining branch have presented progress reports with discussions and suggestions for the consideration of the industry: Drilling Machines and Drill Steel, N. B. Braly, chairman; Underground Transportation, William B. Daly, chairman; Fire Fighting Equipment, William Conibear, chairman; Mine Ventilation, Charles A. Mitke, chairman, (temporary); Mechanical Loading Underground, Lucien Eaton, chairman; Mine Timbers, Gerald Sharman, chairman; Mine Accounting, T. O. McGrath, chairman.

It is the desire of the Standardization Division of the American Mining Congress and of all those who have been carrying on this extensive work of standardization, to have the widest possible distribution of this bulletin to the mining industry. It is hoped that there will be a widespread interest in this important work, which should be indicated by the constructive criticism of these reports from the industry. All such criticism will be referred to the appropriate committee for their careful consideration.

Oil Problems in the Uinta Basin.—(IV.)

By Prof. Earl Douglass.

(NOTE—For a description of asphalt deposits of the Uinta Basin see *The Asphalt and Bituminous Rock Deposits of the Uinta Shales*.—Geo. H. Eldredge, Twenty-second Rep. U. S. Geol. Surv. Vol. 1, pp. 330-364.)

Surface Indications—Gilsonite—In studying the surface indications of oil we will begin with uintaite, more commonly called gilsonite, as it is the hydrocarbon which is most abundant and has attracted the most widespread interest. This, with the other hydrocarbons, is recognized as an oxidized residue which remains after the vaporization of the more volatile constituents of petroleum; so, if we can trace its origin and history, it ought to take us a long way toward the solution of the oil-problem.

One who is impressed with natural phenomena and natural curiosities will hardly forget the impressions made by the first sight of a large open vein of this clean, black, shiny hydrocarbon which fills the space between the clean-cut vertically parted walls of sandstone or sandy shales, and extend for miles in either direction.

Some of the questions which naturally arise sooner or later, if he thinks much of the matter, are:

What is it?

Where did it come from?

How did it get here?

Why are the walls so straight and smooth-looking—as if they had been cut open for the purpose of holding the gilsonite?

Why are they almost perfectly perpendicular?

Why do the veins nearly all extend in the same direction?

Why is the appearance next to the walls usually somewhat different from that in the middle of the veins?

Why do the veins occur in this particular formation?

Unless the mineral was formed when the rocks were formed it must have been soft when it came into the fissures. If so, what held the fissures open until it hardened?

If the veins remained open why, instead of seeing clean pure gilsonite, do we not find it mixed with rocks, vegetation and debris, etc., from the surface?

Why, like wells, prospect holes, etc., do these fissures not serve as traps to catch rabbits, mice and other animals, recent and extinct, thus preserving their skeletons in the gilsonite, something as they are preserved in the asphalt beds near Los Angeles in California, and in other places?

If this is the heavier residue of petroleum what became of the lighter or more volatile portions?

Where, when, and under what conditions did this inspissation or vaporization and oxidization take place?

How could it take place deep in the earth where there is little atmosphere and no currents of air to carry off the volatile portions?

As the veins go down several hundred feet, at least, how could it come up from beneath, as it has been surmised that it did?

It has been inferred that it came up under pressure. What could have forced it up unless by the closing of the

fissures beneath? If this had occurred would the upper portions of the fissures have remained open?

Did the material come from the surrounding rock? If so this of course would be petroliferous.

It is said that a fool can ask more questions than several wise men can answer. These, however, are not fool questions, but those which a wise man will surely try to answer, if he is going to invest his money in prospecting for oil here.

There seems to be at least one encouraging smile on the face of this sphinx. The lighter constituents of petroleum escape in the presence of the atmosphere, so one would naturally suppose that the forming of the viscid, or solid hydrocarbons, would take place near the surface of the earth. If so perhaps it is going on yet and can be observed; or if not, we may find where it has taken place.

Besides the theory stated and quoted by geologists



Outcropping of Gilsonite vein in the sandstones of the Middle Uintah formation. In line, with excavation in foreground may be seen many such openings along the vein for a great distance.

that the asphalts came from beneath under pressure, I have heard another theory stated orally. It was in substance as follows:

Before erosion had proceeded so far there was a lake of liquid asphalt similar to the pitch lakes of Trinidad and Venezuela. The earth was fissured beneath and the asphalt descended into the fissures. The site of the lake or lakes was later eroded away and the hardened veins came to view. I have laughed at this, but after all, is it not as rational as the theory that the gilsonite came from below under pressure, and have we any right to say without a fair investigation that it is not nearer to the truth?

The question as to what gilsonite is, has been discussed in previous articles, but we will repeat the definition here.

It is on the Uinta Railway stage line on the bench land north of White River that some of the larger gilsonite veins can be most conveniently seen and the narrow-gauge Uinta railway line was built into the basin to furnish transportation for the gilsonite. In several places the veins have been worked for the ore and the trend can be traced over the open country for miles as they are marked by piles of

the gilsonite which have been thrown out in doing assessment work. The direction of the veins approximate a northwest and southeast direction. They are therefore nearly parallel, yet not exactly so. It is said that the Little Bonanza and Big Bonanza veins converge, until to the southeastward towards the White river, they unite into one large vein. This group consists of at least five veins—the Cowboy, the Little Bonanza, the Big Bonanza, the Chapita and the Wagonhound—the trend of which is almost uniformly N. 60° W., according to Eldredge. They are exposed for a distance of from one and a half to ten or eleven miles, but they probably extend much farther. They terminate to the southeastward at the escarpment of the White River canyon, where the Uinta sandstones, which contain the larger veins end, having been eroded away to the southward. To the northwestward the Lower Uinta and Middle Uinta deposits extend under the Upper Uinta deposits, which are composed principally of clay and sand with bands of sandstone. Here the veins become narrow and, I believe, all die out. The clays have apparently taken up the stress without fissuring. This condition will again

extends southeastward to Dragon, on Evacuation Creek, and includes the Rainbow, the Ute veins, and the Black Dragon. In its extension to the northwestward this zone apparently includes the Duchesne and its companion vein or veins, near Ft. Duchesne. The extreme exposures are about sixty miles apart. As now known then, the extreme length of the area containing large veins is, at last, sixty miles in a northwest and southeast direction and about forty miles in width at right angles to this. The more western and northwestern veins including the Pariette and Duchesne veins, do not trend so much to the westward as the more eastern veins. According to Eldredge their course is N. 35° to 40° W.

Prof. Eldredge made estimates of the quantities of gilsonite in the larger workable veins—the Cowboy, Little Bonanza, Big Bonanza, Black Dragon, Rainbow, Culmer, Duchesne and Colorado. His estimates were probably far below the actual amount as he took into consideration only the length of the veins actually exposed. As above stated they probably extend under the Upper Uinta deposits to the northward, where these beds are not eroded away.

The estimate of Eldredge is nearly 32,000,000 tons. The amount of residue, which does not include the smaller veins or perhaps all the large ones, certainly represents a large amount of petroleum.

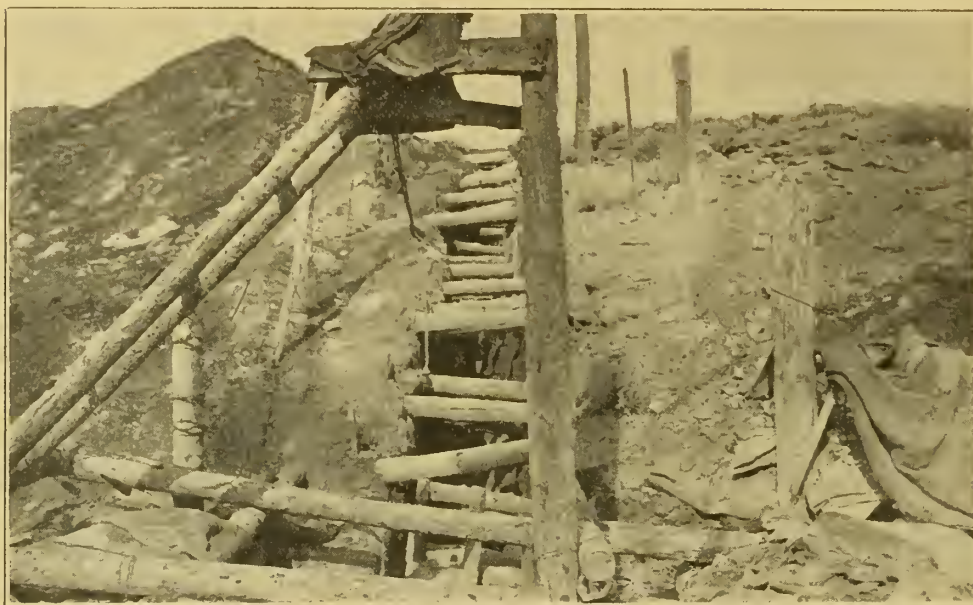
We speak of paraffine oils as those with a paraffine base, and asphaltic oils as those with an asphalt base. A large proportion of the oils contain both paraffine and asphalt, but one or the other usually predominates. Though we have here immense deposits of asphalt of various kinds we cannot say yet whether the oil which they produced was a light (paraffine) or a heavy (asphalt) oil, or whether it was an intermediate. It is possible that before we get through we may be able to make a good guess.

In the few tables of analyses of petroleum to which I now have access, the asphalt residue runs from zero up to 33%. But the heavier oils are undoubtedly thickened by evaporation of the lighter constituents like some in California, for example.

It seems to me that an average of one pound of residue from a gallon of oil (12½%) would not be an unreasonable estimate for our purpose, which is to get some faint idea of the amount of oil which the gilsonite represents. On this basis then, the 32,000,000 tons or 64,000,000 pounds of gilsonite would represent 64,000,000,000 gallons or 1,280,000,000 barrels of petroleum.

"That is not very much," you may say, "in this age of big things," but it is altogether too much to ignore. Suppose, too, that it should turn out that this has come from a comparatively small part of the petroliferous area. It might run into large figures.

In the next article we will try to trace these veins to see whence they came or whither they go. As these articles are preliminary studies and the author, in his isolated position, has no access to any library, except his own, mistakes will inevitably occur. It is the truth that is desired and he will be glad to have his attention called to any errors which may occur.



Showing a vein of Gilsonite at Little Bonanza, Uintah county. The timbers are placed as seen to prevent the fissure from closing up

be referred to, later, as a probable explanation of one of the questions asked above. It is probable then that the larger veins extend under the uneroded covering of the Upper Uinta for a considerable distance—perhaps much greater than the length of the exposed portions. In width the veins vary from a foot or two to sixteen or eighteen feet. On closer examination it is seen that in linear extent the veins are slightly sinuous and looking down in them from above the walls are sometimes seen to be somewhat wavy.

Southeastward from this group of veins, which we will call the Bonanza group, is a wide band of exposure of the lower and middle beds of the Uinta in the erosional area of the White River and its southern tributaries. Traversing this region in apparently the same direction are two or more successive bands or zones of gilsonite veins. As in the group already described there are usually five or six principal veins. The zones are about four or five miles in width and the veinless or nearly veinless bands between are of about the same width, if the mapping of Eldredge and my observations are correct. (See Plate XXXIII, opposite p. 332, in report of Eldredge.)

The next zone southwestward from the Bonanza group

AN "OLD PROSPECTOR" INTERVIEWED ON THE PENDING NEW MINING LAWS

By Rolland C. Neenan.

Pat Ladigan is a prospector. Someone with a gift for saying a lot in a few words once rose to inform the world that a prospector is a liar with a hole in the ground. That introduces Pat. Pat is always glad to see me; he thinks I believe the monstrous yarns he tells. Pat lives up the gulch a ways from me, and on evenings when I have finished reading all the current works of fiction at hand, I meander up to Pat's and make a sort of post-graduate course from him. Therefore, last evening found me seated by the Ladigan fire, listening to the Ladigan voice, and marveling at Ladigan imagination.

I had been attempting to sound Pat for his views on the proposed new mining laws, but Pat is rather deep, and hard to sound. He said a lot, but whether he meant it or not, I'll leave to you.

"My opinion," said Mr. Ladigan, "is that these here new mining laws are all a d——d nuisance. How in the name of a round hog's grandmother, are you going to "regulate" such a damn irregular game as prospecting and mining in general, huh?"

"Regulate!" Pat said it like an oath. "What they should ought to do is prohibit!"

"Prohibit?" I repeated stupidly. "Prohibit what?"

"Prospecting," snapped my host.

"Don't stop now," I urged gently. "I believe that I am going to agree with you for once. Go on."

Pat seemed intent on some deep problem for a moment, but the silence couldn't last. Pat likes to talk too well to waste time thinking.

"It's getting pretty late," he continued finally, "to begin such a reform, but it ain't too late. Of course us prospectors are getting to be few and far between. We will soon be as hard to discover as the bartender who used to know what you wanted the minute you staggered in the door; but it isn't too late to reform. Perhaps this prospecting habit would die out of its own accord in a little while, but a stitch in time saves a heluva lot of embarrassment, as the feller said when his suspender buttons all come off.

"Now you gotta admit that prospecting is a gamble and gambling is unlawful and immoral and d——d expensive. Yis-er!"

"These here, now comparatively United States of ours, have been doing a lot of amending and tampering and—maybe—improving to the Constitution. It won't make it a dern bit less artistic to add one more amendment making it unlawful to go into the hills and try to rob the poor defenseless earth of its gold and silver and everything. Think, if you have the machinery, of the thousands of drunk—I mean prospectors whose immoral—I mean immortal—souls would of been saved if they had been brought up to respect the rights of Nature to keep for herself the treasures of her bosom—or words to that effect. Think of all the misguided, unfortunate old mountain cats and desert rats, who might of been saved from the life of sin and sow-belly if their parents had of been able to tell them that there was a law against prospecting.

"Take me, for instance, and for a horrible example. At sixteen I was enjoying all the comforts that a 10-acre farm in a rocky Missouri hillside could give to a family of twelve. I had all the eating terbacker I wanted, and almost enough food. I might of grewed up and got a razor-back hog and a wife of my own, if I hadn't felt the call of the West and the itch of the prospecting fever. But no; I didn't know when I was well off. One day I had a argument with Pa about which of us could

spit the furthest. I got huffy, because the old man cheated by leaning forward when he spit, and I busted an axe handle over his head. That made it necessary for me to depart away from there, because that axe-handle was the best one on the place. So I started West.

"The point of which is, that if I hadn't of been indulging in immoral dreams of the wealth that was waiting in the hills out here for me to come and dig up, I wouldn't of lost my temper that away thinking and wouldn't of had to leave home so sudden like. Naturally if there had been a prohibition against prospecting, it wouldn't never have occurred to me to try to rob the poor old earth, no more than that I would think now of trying to buy a drink.

"Prospecting has ruined more careers than rum or politics. Nobody ever amounts to a whoop in the Grand Canyon after he once shakes a gold pan. Men that might of amounted to something have taken to prospecting—and lost all chance for salvation.

"Them that does happen to strike it rich, mostly wind up by blowing in their rolls, then blowing out their brains or whatever was in their skulls. Them that doesn't hit a pay-streak wind up in some gulch where they spend their time wondering how they got that way, in their rational moments, and the rest of the while most likely telling the chipmunks and the rats what a fine time they (the prospectors) is going to have being Queen of the May or something.

"Yessir, it oughta be stopped. I just been thinking of what prospecting done to a young Englishman I knew once. He was all educated up in the old country, had the best of everything, but he fell for the lure of the wild and woolly. Maybe it was because he had red hair, I dunno. But anyhow, inside a year he was just as big a liar and as much fallen from grace as any of us. Says he one day, when he remembered who he had been and realized what he had become. 'At home I was called the auburn haired son of a lord; over here I'm just a damn red-headed Cousin Jack.'

"That's just a fair example. Prohibit it! Booze gave us an introduction to those three gay little fairies—R. E. Morse, R. E. Gret and R. E. Form. The prospector met the first two; it's time he met the last."

"But Pat," I gasped after he had stopped, "that's a rather drastic proposal, isn't it?"

"It ought to be even drasticker," retorted Pat. "Punish those who disregard the law. First time a feller is caught prospecting, fine him; if he backslides again, make a dry-land farmer out of him."

"That's all very well, but," I insisted, "the liquor prohibition law is said to have set a lot of former tetotalers to sipping little beams of moonshine. Don't you think prospecting would be the same? Wouldn't there be more attracted to the search for mineral if it were forbidden?"

"You are the ding-dongedest, most argumentiferous cuss I know," sighed Pat. "Isn't that what these here new mining law sharks are trying to bring about? Won't it be a damsite simpler to follow my system, huh? Just tell everybody they can't and mustn't prospect, and first thing you know there'll be more new mines than there are stills in this country. What more do you want? You'd better go home."—and I went.

Some people are so busy worrying about the general depression that they haven't time to go after new business.—Rochester Times-Union.

"Opportunity may knock only once with some pertikler proposition," says Uncle Ezra, "but it'll be back lots of times with somethin' else."

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*Illustrated.

THE BUSINESS SITUATION

Business statistics for December now coming to hand are of an encouraging character, says the Boston Commercial. Improvement registered in preceding months was maintained, and some further advances toward better conditions are recorded. Steel ingot production increased slightly, as did the unfilled orders of the United States Steel corporation. In spite of receding quotations for some important commodities, the Bradstreet's price index moved upward. Coal production declined, while petroleum production recorded a material increase. The banking position of the country improved. Exports were stimulated by higher prices for foreign exchange. The non-ferrous metal lines progressed rapidly toward normal. Christmas trade exceeded expectations. Mail order business shows encouraging gains.

Usual January dullness has characterized the month thus far. Mark-down sales, however, have not been as sensational or panic-stricken as for two years past. On the whole, trade trends are disappointing only to those who have been expecting too much. The only notable trade reaction has occurred in oil, a line which recovered with dangerous rapidity through the fall months.

The business situation is sound. Liquidation has been fairly well completed in most lines. Production of almost

everything for the past year and a half has been below normal. There still are some grotesque inequalities in prices, but every week sees these further adjusted toward a working basis. That business still is very sub-normal is eloquently indicated by the growing surplus of available liquid funds. In reality there is a scarcity of credit, but business is using so little money that there appears to be a surplus. As business recovers, money should be less plentiful and higher. Rising interest rates, when they appear, will be an indication of advancing business tides.

Recovery necessarily is slow; but its very slowness is a healthy factor. No unhealthy situations are likely to develop. The trend is definitely, although silently, upward.

LEAD, A MOST FAVORED METAL

According to the Financial Review of New York, lead occupies the most advantageous position of any of the base metals. Close control of the industry, which is concentrated in the hands of a comparatively few large powerful operators, effectually dampens wide price fluctuations and tends to eliminate overproduction during slack periods, with corresponding accumulation of large unsold metal stocks. Supply and demand have been nicely adjusted for some time, judging from the steadiness of the market at its present readjusted level.

Domestic lead production in 1921 declined only 20% to 390,000 tons, as compared with 476,849 in 1920. World output over the same periods contracted from approximately 1,000,000 short tons to 885,000, as against 1,127,500 in 1914. The war-time world-record was only 1,300,000 short tons.

Foreign metal movements were maintained in a high level in 1921. Total exports are estimated at 33,700 tons, as compared with 26,268 in the preceding annual period. Imports, which for the years 1916 to 1919 inclusive, had been a little over 5,000 tons a year, advanced to 35,719 in 1920, and held at 32,000 for 1921. The heavy import movement was stimulated by prostrated European exchange, facilitating marketing operations in this country in terms of gold.

The price average for the year is computed at 4.39 cents a pound, with 3.90 "low," and 5.05 "high." The war-peak average was only 8.92 cents a pound, St. Louis basis. In 1915, metal sold down to 3.50 cents a pound. Present rates indicate that lead has suffered least in proportion of any of the base metals.

Absence of unwieldy unsold lead accumulations has proven the most important factor, from the market standpoint. Supplies available for consumption are closely co-ordinated with the actual demand. This is possible only through the close control of the industry, as well as the formidable tariff of 25% ad valorem.

COLORADO'S METAL PRODUCTION.

The following is given as the production of metals in Colorado in 1921:

Gold.....	\$6,770,000
Silver.....	5,400,000
Copper.....	430,500
Lead.....	922,500
Zinc.....	117,500
Manganese-silver.....	13,125
Arsenic, thallium, cadmium.....	520,000
Radium.....	4,200,500
Chemicals from ores.....	1,949,120

Sandpoint, Idaho, disposed of \$125,000 school bonds to be used for new high school building and \$15,000 for equipment.

How to Cut Mining Costs

By Letson Balliet, Mining Engineer.

(Mr. Balliet was taken from the mines and made efficiency engineer in one of the largest ship yards in the country during the war, and has reduced the operating expenses of a number of other industries and mines without labor difficulties.)

Mr. Mine Manager, you are very careful not to "salt" your own samples or assays, because you do not want to fool yourself. You do not want to send in your sheet of assays, and then find that the mill run doesn't stand up to the assays. You go to very careful lengths to know the value per ton of every ton sent to mill for treatment, and the per cent of value at every step of the process.

It's "lots of trouble," isn't it? But just the same you must **know**. Guessing won't do. If there is any step that isn't making the saving you must **know** where to put your hand on the loss. You can't very well cut the wages of the miners and laborers to make up for losses in some step of the treatment, because you cannot fool the directors into believing that you are saving the values by cutting the wages.

If you knew as much about your **Costs Per Ton** as you do about your **Value Per Ton**, your **Costs Per Ton** would be less and your **Profits Per Ton** would be larger.

Every industry, every development, and every construction job, is planned and directed by an engineer. Success or failure of the enterprise is laid upon the shoulders of the engineer. It makes no difference, whether it be the construction of a building, a factory, tunneling a mountain, damming a river, building a canal, a power plant, or developing a mine, the stockholders or investors who furnish the money expect to make a profit upon their investment. They put the responsibility upon the engineer. He must figure out the cost of materials, tools, supplies, freight, power, distance from market, sanitary conditions, construction costs, time required, labor, and the cost of the product or finished job.

The Capitalist, the Engineer and Labor.

Every capitalist expects the engineer to be right. If he did not, he would not invest his money under that engineer's direction. He would at least get other engineering advice.

Under these conditions—which exist everywhere—the engineers are held responsible for the **Cost of the Finished Product**, and are responsible for the expenditure of the money in every step. Why then should a president or board of directors "but in" and tamper with the wages of labor, any more than they should tamper with machinery or equipment?

If the costs are too high for the finished product to yield a profit, the board or executive officers might direct the engineers to devise ways and means of reducing costs, or get other engineers' advice, or shut down till equipment and modern methods can be applied. But there is no more sense in throwing a monkey wrench into the labor units than there is in throwing it into any other piece of machinery under the direction of the engineer.

The engineer knows (or should know) what labor is worth and how to use it without abuse, just as he knows every other step of the work. If he don't know, the industry needs another engineer.

Labor depends upon the engineer for its job, its safety and its directions. Without the engineer, labor would not know what to do nor how to do it. Capital depends upon the engineer for its job, its safety, and its directions. Without the engineer capital would not know what to do, nor how to do it.

The engineer knows how much each are worth. Both depend on him. He is the natural one and the only qualified one to adjust the earning capacities of both. Put the matter squarely on the engineer's shoulders.

Both capital and labor are greedy; they want all they can get, but neither one knows how to figure "costs per ton" in advance of the work. Many accountants can tell you what it **does** cost, but only the engineer can tell you what it **should** cost.

If you'll put your problems fairly up to the engineer, and let him work out all the details—including the labor—you'll have no labor difficulties.

I have handled men for 25 years, and have had many thousands on the payroll at a time. I have never had a labor dispute of one hour, nor have I ever had committees of the workers wait on me, to demand or request anything. I am going to give you here my method of avoiding labor difficulties, and keeping the cost of production at the very bottom.

How to Avoid Labor Difficulties.

Whenever any neighboring plant under similar conditions is producing at a lower cost per ton than I am, then I think there is something wrong with me, and I find out.

Remember this, that it is fully as important, (if not more so) that the boss be satisfactory to the men, as it is for the men to be satisfactory to the boss. You cannot get efficient co-operation out of dissatisfied workers. It cannot be done.

Primarily, we must remember that efficiency does not bubble up from the bottom. It filters down from the top. No industry is more efficient than its head. You can kick and complain about your "labor," but they are justly entitled to make the same kick and complaint about you. A man's value to his company or employers is in proportion to his ability to work in harmony with his fellow men, and this goes from manager down to the lowest paid man on the job. Whenever I cannot get along with my men, by usefulness to my employers is gone.

Secondarily we must remember that you cannot stop a leak unless you know where the leak and waste is located.

I know, when the board of directors write a letter saying "your expense are too high; your costs of output are too much; you must reduce operating expense," etc., that managers the world over, have hidden their **own** inefficiency by cutting wages. You can often bluff your board of directors that way, but there is one man whom you cannot bluff, and that is the **Man Who Is Doing The Work For You**. He has resented the cuts in his wages in various ways. He has asked you to cut your own salaries and other expenses first. He sees wastes that you don't see, and don't encourage him to point out to you. He knows just how competent and efficient you are—and respects you accordingly.

What would you think of a mine manager, or industrial manager who would go to the treasurer of the company on the last day of the year and ask him to figure up from the check stubs, just how much money had been expended during the year for all purposes who, after getting the figure, would divide it by the number of tons produced by the plant, and say "**That's the cost per ton**"?

That would be "some report" for a mine manager. It is true, that it would tell exactly how much WAS spent per ton produced, but it might include wine suppers, automobiles, or misappropriated or wasted money and there would be no way of telling from such a report how much more was spent than should have been spent.

It is customary at many industrial plants to have a

"grave yard" or an account that is nothing but a "burying ground" for misspent money. Sometimes several such accounts are found. "Permanent Improvements," unless the vouchers are very explicitly filled out, is a convenient place to cover up money and waste, yet it is necessary to have such an account. It is a hard one to audit.

But when the orders come out of the upper office to "cut the costs" why jump onto the laborers' wage without knowing where else you can cut?

Systematic Checking of Expenses.

In order that I may know where my expenses are, I divide the work into **Six or Seven, or More** "departments" designated upon books, requisitions, and checks by letters, A. B. C. D. E. F. G. etc., which will be explained as follows.

Department A. "**Producers**"—In a mine this includes drillers, muckers, and trammers, working in ore.

Department B. "**Developers**"—This includes drillers, muckers, and trammers doing dead work in waste rock.

Where the same men tram some ore and some waste, the car report shows the number of cars of each, for example: "10 cars waste and 10 cars of ore" divides that man's time between department A and B. This does not show on the pay check, but merely on the office records and is really quite simple accounting. The greater the number of men employed the greater the need for competent efficiency, for if one man wastes a dollar, 20,000 will waste \$20,000.

Department C. "**Service**"—Hoist engineers, electricians, pump men, compressor men, firemen, teamsters, tool nippers, waterboy, blacksmith, timber framers, machinists, etc.—men who give service to the other working departments.

Department D. "**Improvers**"—Labor performed on permanent improvements, building a mill, setting new machinery, additions to plant, road building, driving a drain tunnel, etc. Men of all departments charge their time to "D" when so employed.

Department E. "**Upkeep and Repair**"—Machinists, pipe fitters, carpenters, blacksmiths, electricians, etc. The employees from any part of the works may be engaged in repair work at times, or extra men may be employed; but care should be used to have the time of any man engaged on repair work charged to the Repair department.

Department F. "**Bosses and Watchmen**."—Superintendents, foremen, bosses, watchmen, timekeepers, surveyors.

Department G. "**Office**"—Manager, clerks, messengers, stenographers, bookkeepers, auto drivers, draftsmen, office boy, etc. If a carpenter is taken from the timber framing shop to fix a screen door at the office, his time so used is charged to department "G"

I have before me the annual reports of six different mines. Each report is quite lengthy, and shows the "cost per ton" to vary from \$6 to \$13 per ton. I wonder what would happen if the manager of the \$6 mine would change places with the manager of the \$13 mine. When the \$13 man is asked why the difference in cost, he has "reasons" and "excuses" for the high cost, but the next manager remedies them. What are "excuses" to one manager are "inexcusable errors" to another.

In the following tabulation the costs per ton have been so carefully disguised by change of figures, rates, etc., that it is impossible for even the manager who made the reports to identify his mine. It is not the intention to criticize any mine manager, but to lay down some thought that may be helpful in avoiding labor difficulties. The figures in the table are relatively the same as shown by the six reports.

TABLE OF COSTS PER TON AT SIX MINES UNDER SIMILAR OPERATING CONDITIONS.

Department.	Mine No. 1	Mine No. 2	Mine No. 3	Mine No. 4	Mine No. 5	Mine No. 6
"A" Producers	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00
"B" Developers	1.00	1.00	1.00	1.00	1.00	1.00
"C" Service	2.00	1.90	1.75	1.50	1.25	1.00
"D" Improvements	3.00	2.75	2.50	2.00	1.50	1.00
"E" Upkeep and Repairs...	1.10	.95	.85	.80	.75	.70
"F" Bosses and Watchmen..	1.50	1.25	1.00	1.10	1.00	.75
"G" Office	3.50	3.00	2.75	2.00	1.50	.50
Totals	\$13.10	\$11.85	\$10.85	\$ 9.40	\$ 8.00	\$ 5.95

While these figures are intentionally camouflaged, they are illustrative. Power bills of course are "service;" explosives, generally are divided between Producers and Developers and any number of subdivisions can be made, to suit the ideas of the accountant and bookkeepers.

Assuming that you were the president of a board of directors who received a subdivided account of "costs per ton" like Mine No. 1, where would you direct your mine manager to make the cut? Quite certainly a cut of 10% in the wages of the producers wouldn't afford great relief. In fact it would reduce the spirit of the crew, and the production would be less, making the "overhead" greater and the cost per ton would likely increase.

Industrial and mine managers will look at this table and make the excuse that it is too much work and too complicated, but in reality it is much more simple than it looks, and makes office work easier. It is used in a similar form in every big efficient industrial plant in the country, even where they make a weekly pay-roll. It is used with any number of men from a dozen to 50,000.

The great value of the method to mine managers is that it tells at a glance just where the expense is eating up the profits. Mine No. 1 has \$12 out of \$13 as "overhead," while Mine No. 6 has but \$5 overhead out of \$6 cost.

I have found that if I cut my overhead down first, that I get the hearty co-operation of my labor in cutting it down and I can satisfy my directors without quarreling with my labor. It's the cost per ton that interests the directors, not the price I pay for anything.

Whenever I hear a man complaining about the inefficiency of his help, I know that labor is no more efficient than the boss. Efficiency comes in at the top, not at the bottom.

If your workers will not help you—if they are recalcitrant to increased efficiency—you are not efficient. Don't mistake strenuousness for efficiency. A horse can pull more in a wagon than he can drag on the ground, hence you make it as easy as you can for the horse. Why not for the men? The easier you make it for them to accomplish their work the more they do. You must set the example. I can say, "Come on boys," and lead a bunch of men over the top any place but I can't say "Go on boys," and get results.

WORLD SILVER OUTPUT.

An estimate of the world's production and consumption of silver in 1921, prepared by Handy & Harman, gives the world's total product last year as 161,000,000 ounces against 174,000,000 in 1920. Of this total the United States is estimated to have produced 60,000,000 ounces in 1921, against 55,400,000 in 1920; Mexico, 62,000,000, against 66,700,000; Canada, 10,000,000, against 12,800,000 and other countries, 39,000,000, against 39,300,000.

The sampling of coals from the mines of Carbon county, Utah, has been completed by the Bureau of Mines. A bulletin on the analyses of Utah coal generally is being prepared for publication.

BRISTOL SILVER ORE BODY INCREASING IN MAGNITUDE.

On the 900-foot level of the Bristol Silver mine, at Pioche, recent developments are proving up an ore body of increasing magnitude and the drift to the south of the shaft in the hanging wall of the May Day fissure has passed through 47 feet of ore, which will average over \$20 per ton in value, according to advices from camp. Crosscutting of this ore body at right angles to the drift has not resulted in the finding of the limits of the ore.

The shaft work, which has been delayed during the past three months on account of the non-arrival of additional machinery and equipment, is now being actively pushed and this important work which will eliminate all extra transfers of ore, should be completed by the middle of February. An incline winze connecting the 600-foot with the 900-foot level will be driven through to the surface, operations being conducted from three points, which method will greatly expedite the work.

In addition to the driving of this heading, which comprises the company's principal development work, the tramway is being overhauled and the new traction rope is being placed in commission. To replace the old cable about four miles of new rope will be used, the total length of the tramway, extending from the Bristol mines to the railroad loading station at Jackrabbit, the present terminus of the Pioche Pacific railroad, is approximately 9000 feet.

Manager E. H. Snyder, states that in driving the crosscut from the May Day fissure drift, a cave thirty feet in length has been opened up. This cave is filled with carbonate ore of shipping grade. This territory is virgin ground and is intensely mineralized. For a distance of 200 feet along the strike of the ore channel and for a width of from fifty to sixty feet, the entire country, after sorting out the lime, which occurs in small horses, makes a profitable shipping ore body. The ore is essentially a silver-lead product with a small copper content and at the present time shows no signs of changing to a sulphide state. In the opinion of Manager Snyder the water level will not be encountered until a depth of at least 800 feet below the mine bottom is reached, and when such sulphide zone is encountered the ore should experience a secondary enrichment.

The Bristol mine has an assured future, assured on account of the large indicated ore tonnage it possesses, and with the gradual decreases—the present aim of the efficient management—in the cost of mining and transportation, steady profits should be made by the Bristol Silver Mines Company during the ensuing year.

California's Mineral Production

The total value of the mineral production of California for the year 1921, just closed, is conservatively estimated by the statistical division of the State Mining Bureau under direction of Fletcher Hamilton, State Mineralogist, to have been approximately \$244,856,910. This is, in part, detailed in the tabulation below; but as there are more than fifty mineral substances on California's commercial list, it is impractical at this early date to obtain definite figures on other than the more important items.

This estimated total of \$244,856,910 is an increase of \$2,757,243 over the value of the 1920 production, and is due mainly to increases by petroleum, gold and silver. Preliminary reports indicate a record held by petroleum for the year 1921. The total would have been even greater than

here shown but for the strike of employees in the San Joaquin Valley fields during September and October. For the first eight months of 1921 the yield averaged 10,100,000 barrels per month. The increase in total value for the year was not in the same proportion as the increase in quantity, because the price was somewhat lower (\$1.60 per barrel, against \$1.73) than that for 1920. The figure here used is the average of quotation for 20° gravity oil in the San Joaquin fields during 1921.

Gold mining in California has apparently passed the low point in its career due to the war-time and post-war economic situation, and is now on the up-grade again. Reports indicate a revival in many gold districts and the output for the year, based on 11 months' shipments, is estimated at \$15,800,000 or an increase of approximately \$1,500,000.

Silver is estimated at \$3,500,000 (At \$1 per ounce), the greatest of any year (except one, 1884), in California. This is due to the persistence of high-grade ore shipments from the California Rand mine and adjacent leases, near Randsburg.

Copper though decreasing about one-sixth in quantity, shows only a little over one-half the value of the previous year due to the drop in price from an average of 18.4c to 12.6c per pound.

Lead, zinc, and quicksilver, all show material decreases, both in quantity and in value per unit.

The output of quicksilver was the lowest in the history of that metal in California, and is due directly to the competition of cheaper foreign metal imported from Spain and Italy, against which we have only a negligible tariff protection. Magnesite shows decrease of about 25% in quantity.

The condition at present confronting the domestic producers of quicksilver, magnesite, tungsten, chromite, manganese, and talc (to mention only those minerals in which California is especially interested), make it necessary that a tariff should be placed on foreign importation if our domestic output of these ores is to continue.

The structural group—brick, cement, building stone, crushed rock, etc.—had some "ups and downs" during the past year, but the prospects are for increased activity during 1922. Building work was tied up for some weeks in 1921 in the San Francisco district owing to strikes, but other parts of the state were not affected in the same degree. Active interest has been shown in the demand for many of the "industrial" minerals and the salines.

The estimated quantities and values for 1921 are tabulated as follows:

\$ 15,800,000	gold.
3,500,000	(3,500,000 fine oz.) silver.
1,477,710	(11,700,000 lb.) copper.
36,880	(800,000 lb.) lead.
43,520	(850,000 lb.) zinc.
113,800	(2,400 flasks) quicksilver.
45,000	(500 fine oz.) platinum.
182,400,000	(114,000,000 bbl.) petroleum.
3,900,000	(60,000,000 M. cu. ft.) natural gas.
540,000	(54,000 tons, crude) magnesite.
27,000,000	brick, cement, bldg. stone, crushed rock, etc.
3,500,000	Miscellaneous "industrial" minerals.
\$244,856,910	Total.
\$244,856,910	Total.

Wanted—Job by man and wife in mining camp. Wife to cook for men; man to work at mine. Address: H. E. Wagner, No. 7 So. Fourth East St., Salt Lake City, Utah. 2-ft-30-15.

Ore-Crushing Efficiency for 1922

By Arthur O. Gates*

The four years, 1915 to 1919, covered a period in the history of milling of ores, particularly copper, lead and zinc, when the total production of the metal was the primary consideration. It is hardly necessary to mention that during the first part of these war years there were big profits in sight for big production, and later there were vital national necessities. There were wonders performed in the way of increased capacities from old plants, speed in getting new units into operation, and in keeping up production with a reduced personnel; the results accomplished were distinctly creditable to the operators of all classes.

The art of concentration milling during this period was advanced by two notable features—flotation and ball-milling.

Flotation, which was taken up in this country but two or three years previous to the time mentioned, became very generally applied, and made possible increased extraction in less space than had previously been required for the table and vanners. It had the effect of presenting an enormous amount of surface on which the separations could be made, the surface of tables and vanners being easily determined and very much limited and considerably crowded in regular practice. It was particularly suitable for treatment of the very fine material; to most mill men this meant that there was now no great necessity of watching crushing closely to prevent the formation of slimes.

With an increased tonnage possible in the same building, by the use of flotation, the mill operator naturally will cast about for means of increasing the capacity of the crushing unit to keep pace with the concentration end. This was made possible by the use of balls in the older mills of the pebble class, or by the substitution of heavier built mills which would go in the space of the older units, and which would be strong enough to stand the more severe service demanded by the heavier crushing media. Balls had been used for years in the cement industry, large balls in coarse crushing mills, and small pieces of steel or iron in the finishing end of tube mills.

The only departure was to use the balls in wet crushing; ten years ago there were decided doubts as to the way in which a mill equipped with balls and the balls themselves would stand the wear and tear. The balls weighed about three times as much as the flint pebbles used in the mills and it was easily figured that they would do about three times the crushing, which they about accomplished.

War demands established the ball-mill, it could handle big tonnage—and that was the prime consideration up to 1919. And it was the economical machine to use during that period.

The period 1919 to 1921 was one of doubt and uncertainty, with large undigested stocks of metals sitting on the foot-board of the bed like the turkey that worries the small boy after one of our national feasts (poetic license); the period ended in a starvation diet until an appetite could be created; it was naturally a period in which there could be little progress.

Glimpsing the Situation of Today

Now, what of 1922? We feel assured that our plants will be starting up in the early months of the year, and that it will be some months or perhaps years before we get up to the production conditions prevailing from 1915 to 1919. European conditions require low cost metals from this country, if the demand is to be brought back to a reasonable part of what it was before the war. The cost of wages and supplies are coming down, and a better average class of workers is available, but all the reductions in cost cannot be made to come out

of wages. The plants are here, they have more capacity than perhaps will be needed for some time; the problem of the mill operator is to get out the mineral to meet the demand at the lowest possible cost, considering that he has a plant available which has excess capacity and which he is not required to crowd to the limit.

This article and the writer thereof are only concerned with the crushing end of the mill, except insofar as the quality of the crushed product affects the metallurgical work to follow. In spite of all the popular conceptions of flotation and what it will do, at least fifty per cent of the metallurgists with whom I have discussed the subject are more or less of the opinion that flotation has not diminished the ancient requirement of gravity concentration; that fines or slimes are not particularly desirable; that coarse and very fine material do not work as well together in the concentrating machine as material more closely sized; that old principles apply today just as they always have.

Important Features of Rock Crushing

In crushing rock it is the surface produced that absorbs the energy; this energy increases directly as the mesh to which the product is reduced, and can be so measured. It is therefore important to reduce the ore no finer than necessary for metallurgical requirement, if efficiency is to be obtained in crushing. No genius has found a method whereby a given piece of rock may be reduced to particles of a uniform size, nor will such a way be found.

When a piece of rock is broken there are particles of various sizes produced, and there are fine particles produced by the rubbing together of the coarser crushed particles. The metallurgy of an ore requires that it all be crushed so that it pass a given screen opening, like 20-mesh, or 48-mesh, or 65-mesh. The latter two sizes are common for flotation. There seems to be no metallurgical lower limit to size; if the ore will pass through the screen size determined upon, it will be fine enough to free the included mineral, or to allow leaching with the time allowed, etc.; or the power required will not be so great as to offset increased extraction. In only a few cases, like Portland cement, or certain iron and gold ores, is it necessary to get the greater portion of the rock as fine as 200-mesh.

The quantity of minus-200-mesh material produced is that which will bear the most watching, for it is here that energy is dissipated in greater measure than is generally recognized. Various investigators and writers of technical articles have attempted to assign a definite value to the energy lost in the minus-200-mesh, but they rarely assign but a few per cent of its real value, which is difficult of determination, and bears no definite ratio to the energy absorbed between other meshes.

Look Out for the "Minus-200-Mesh"

"Minus-200-mesh" is a term that might be rather loosely applied to all rock that is crushed finer than need be; a slogan is suggested: "Look out for the Minus-200-mesh;" that is the most important place to watch crushing operations, if crushing efficiency is to be made higher.

How to watch it? By means of the Crushing-Surface diagram in which both surface produced and energy absorbed are shown as surfaces, and the quality of both feed and discharge are much better understood than in a mass of screen analyses out of which the average mind can only grasp one or two points. The curves of screen-sizing have the same general shape, much like the indicator card of a steam engine, and equally important facts may be obtained by its study which could not be found otherwise. The Crushing-Surface diagram compares with the ordinary screen analysis just as the steam engine indicator diagram compares to a steam gage. And both can be brought back to terms of coal-pile.

*Mining Mechanical Engineer, Salt Lake City, Utah.

A use of this diagram brings to the attention of operators facts about crushing, particularly in the mills under their own direction, whereby many thousands of dollars could be saved. Many have used it.

Use has been made of this diagram to determine the relative crushing resistance of various rocks or ores as milled in the various plants in this country, and a much better basis for comparing the work of different plans has been arrived at. (See Bulletin of the American Institute of Mining Engineers for August, 1918, Crushing Resistance of Various Ores, by Luther K. Lennox.)

The writer holds rather tenaciously to an opinion with regard to the crushing efficiency of various machines for the purpose now on the market which will not meet with uni-

subsequent treatment. Some of the greatest successes in fine crushing have been made by crowding the mills way beyond the supposed economical limit. The load per horsepower can be increased in three ways:

- By building up a large circulating load through the classifier.
- By reducing the size of the mill.
- In the case of ball mills, by substituting pebbles for balls.

Building up a circulating load is the most common procedure. It has objectional features, principally those of overloading the classifiers and thereby returning to the mill material already fine enough to go on; or, returning material so much finer than the original feed that the latter is bedded on and protected by this fine material so that the time and energy required to reduce it is materially increased.

Reducing the size of the mill of course may be accomplished by getting a smaller mill, or decreasing the working diameter inside, as some of the mills designed for pebbles were reduced when the use of balls was adopted.

Substitution of pebbles for balls appears to be a very logical way of reducing the work done in the mill, thereby reducing the horsepower per ton put through the mill. There was never very much consideration given to the matter of efficiency when the general change from pebbles to balls was made; it was tonnage that was sought.

Changes in Crushing Media Cited

In one mill of which I have a record in my notes, the change from pebbles to manganoid balls was made without any change in the five pounds per ton consumption of crushing media; the tonnage and power were both about doubled and were then limited by the power of the motor which had been originally supplied for crushing with pebbles. (It is only fair to state that this mill was crushing one of the hardest of ores and local conditions seemed to make a big excess of water necessary.) As the pebbles cost less than the balls, the cost per ton was increased, but at that time there were the other advantages. It is hardly worth while in this paper to go into an extended discussion of the relative costs of crushing with the various media as there are so many variable factors involved; each case should be worked out by itself.

In another case the change from pebbles to balls was made with an increase in capacity of 67% and an increase in mesh-tons-per-horsepower-hour of about 6%; my recollection is that the weight of grinding media was reduced from about three pounds of pebbles to about one and one-half pounds of steel balls by the change, consumption per ton.

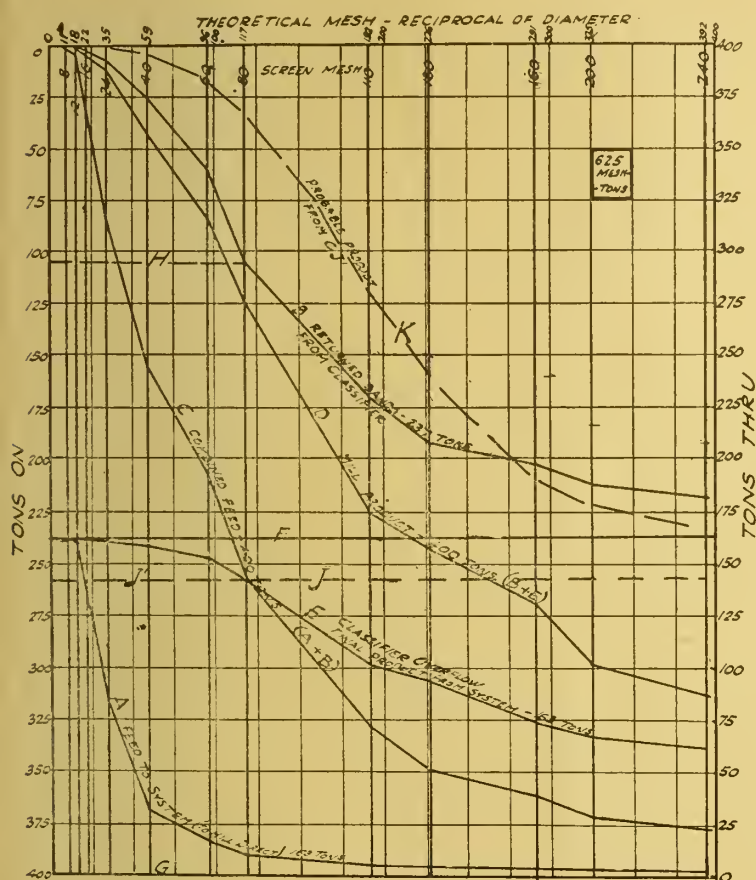
Some data available indicates the following consumptions of grinding media per ton of initial feed to the mill:

Mine Rock	.....15 to 50 pounds
Flint Pebbles	..... 3 to 9 pounds
Manganoid Balls	..... 2 to 5 pounds
Forged Steel Balls	..... 1 to 2 pounds

In one plant where it was desired to substitute ball mills for pebble mills, the use of mine rock had given about 18.2 theoretical mesh-tons-per-horsepower-hour, and with an excessive load of balls it was possible to get 23.2 mesh-tons-per-horsepower-hour; the mill however was not strong enough for such a continuous load, and a mill built for the service probably would have shown little if any advantage over the mine rock. Pebbles gave about 16.3 mesh-tons-per-horsepower-hour.

With a pebble consumption probably less than double that of cast-iron balls, it may be desirable to again consider the use of pebbles in the mills, as well as a reduction in ball load.

The records of most operating companies should contain much data regarding crushing operations, screen analyses with



versal approval—that, leaving out the matter of cost of repairs external to the point where the actual grinding takes place, there is not much to choose from in efficiency between rolls, Chilean mills, pebble mills, ball mills, rod mills, and perhaps some much-despised and relegated mills like the Huntington. His opinion is that it is more a matter of manipulation within the plant, than of the type of mill used. And in manipulation two things are of great importance: the character of the classification accomplished in connection with the particular mill, and the tonnage put through the mill. Size of balls, speed of rotation, and perhaps water content of feed, are of less importance.

It is believed that by getting a close classification of the feed to the mill and by loading it to the maximum capacity, that the most improvement in crushing can be accomplished in this year of our Lord, 1922.

Relation of Capacity of Mill to Efficiency.

It has been found that most mills are underloaded; that as the load on the mill is increased more mesh-tons-per-horsepower-hour are produced within the sizes considered proper for

power consumption and tonnage, so that it will not require a great amount of testing and investigation to determine whether to go back to pebbles, or to continue with balls, and besides, there is considerable more comparative data available whereby one plant's data may be used to some extent in another plant.

Application of the Crushing-Surface Diagram

One use of the Crushing-Surface diagram in connection with the analysis of milling operations is shown in the illustration accompanying this article. In this diagram it will be noted that the various screen analyses of the operation have been plotted, mesh against tonnage: Initial Feed, Sand Returned by Classifiers, Mill Discharge and Classifier Overflow which is the Final Product from the System. The Combined Feed to the System is made by adding weights (ordinates in the diagram) of the initial feed and the classifier sands.

Below the diagram is given a statement of what the various areas contained between the various lines represent, and with an indication of how improvement could probably be made, with an increase in capacity of at least 50%.

Faulty classification is clearly indicated on the diagram. Undoubtedly this was due to using a classifier of capacity way under that required for the duty, or by allowing too large a circulating load to build up. There are those that advocate large circulating loads in order to give the mill sufficient capacity, but it looks to me as though it is far better to use a smaller mill and load it with initial feed, and put the saving in first cost of the mill into more classifiers, or bigger classifiers.

There is nothing particularly new in any of the suggestions offered in this article, for improving the efficiency of crushing operations during 1922. Some of the ideas connected with large tonnage "regardless" may be a little hard to forget, and it is for the purpose of getting down to fundamentals in milling that these suggestions are made.

MINERAL PRODUCTION OF WASHINGTON

Gold, silver, copper, lead and zinc ores, produced by the mines of Washington, were valued at \$356,000 in 1921, compared to \$1,200,320, in 1920, according to United States geological survey. The output was less than any year in the past decade.

Gold production increased from \$120,860 in 1920 to \$1,240,000 in 1921. Most of the gold came from the San Poil, Knob Hill and Surprise mines at Republic.

Silver decreased from 199,678 ounces in 1920 to 132,000 ounces in 1921. Mines at Republic, Nighthawk, Chewelah and Colville produced most of the silver, but the quantity of silver produced from copper ore was unusually small, for the mill at the United silver-copper mine at Chewelah was not operated and the Sunset mine was idle. Rich silver ore was opened in the Old Dominion mine near Colville and ore was milled by the Pyragrite and Four Metals companies in Okanogan county. Copper decreased from about 1,983,134 pounds in 1920 to 402,000 pounds in 1921. Crude copper-silver ore was shipped by the United Silver-Copper mine at Chewelah at the rate of 100 tons a month, compared to 300 tons in 1920.

Lead decreased from 5,787,247 pounds in 1920 to about 130,000 pounds, valued at \$6,073 in 1921.

Despite the low price the Northwest mine near Northport continued to produce zinc in 1921, which was shipped east.

Work on zinc-desclowitz mineral from the Good Springs, Nev., district will be continued by the Bureau of Mines, at the Reno station. The problem involves mechanical concentration and subsequent hydrometallurgical treatment in order to recover the vanadium values.

GENERAL ENGINEERING CO. ISSUES BULLETIN

The General Engineering Co. of Salt Lake City, Utah, has just issued a splendidly compiled and handsomely printed and illustrated eighty-page-and-cover Metallurgical Bulletin. While the motif prompting the issuance of this publication evidently is to acquaint the mining and metallurgical fraternity with the completeness of the company's engineering and ore-testing works, laboratories, etc., in this city, this descriptive feature of the book is hardly more than an introductory to the metallurgical and engineering subjects which fill its pages. If you are interested in milling equipment and up-to-the-minute methods and processes of ore treatment and the economical extraction of values—no matter what the class or character of the ore may be, metallic or otherwise—you can not fail to find much that will rivet your attention in perusing its pages. More than 200 subjects are indexed; there are more than a quarter hundred of half-tones and drawings illustrative of plants and equipments, etc., with tables covering calculations bearing on so many phases of so many pertinent subjects that to even attempt to sketch or outline them here would simply bewilder the reader. The General Engineering Co. has built and equipped so many ore-treating establishments since going into business in 1905 and its experience has been so thorough and its work so commanding, that its reputation has become world-wide.

EAGLE & BLUE BELL STOCK WIND-UP.

In order to retire the outstanding stock of the Eagle & Blue Bell Mining Company, officers of Bingham Mines Company, which is to take over the property of the first named organization, have decided to appraise the value of the Eagle & Blue Bell mine. Formal transfer of the Eagle & Blue Bell properties in this way will be made to the latter by paying those stockholders of the company who have not already exchanged their shares for stock in the Bingham Mines Company, says a dispatch to a local paper from Tintic.

It is understood, however, that practically all of the Eagle & Blue Bell stockholders have exchanged their stock for shares of the Bingham Mines Company. Owners of a few small blocks of stock who have not availed themselves of this offer will be paid in cash under the new arrangement. The new procedure arranged for by officers of the Bingham Mines Company is said to be permissible under the existing laws.

The Bingham Mines Company, which is controlled by Boston financial interests, owns the Eagle & Blue Bell, the Victoria and other Tintic properties as well as valuable holdings in the Bingham district.

TRADE NOTES.

A new catalog has just been issued by the Chicago Fuse Mfg. Co., of Chicago, on electrical protecting materials and conduit fittings. This catalog contains 96 pages with 445 illustrations. It is a veritable encyclopedia that should be in the hands of everyone interested in such electrical devices. No doubt the company will be willing to send a copy to anyone interested.

The Standard Underground Cable Co. announces the following changes in their sales organization. Atlee B. Saurman has been appointed general sales manager, with headquarters in Pittsburgh, Pa., Edward Kerschner has been appointed manager of the new southeastern sales department, with headquarters in Washington, D. C., and F. O. Hoyt, formerly and for many years on the staff of the company's New York sales department, has been appointed manager of the Philadelphia sales department.

Around the State

A recent forty-ton shipment from the Emma property at Alta carried 39 ounces silver and 5% lead.

The Montana-Bingham Mining Company has reduced its operating force to one shift and now employs thirty-five men. The ore is low grade copper and was in demand at the smelter for fluxing purposes. Last year this property produced about one hundred tons of ore daily.

Frank J. Hansen was in Park City on business connected with the Queen Esther group over in the Deer Valley section. A deal for the purchase of the property is pending, details of which will be given to the public later. Mr. Hansen, with his family, are now located in San Francisco, California.

The main office of the East Tintic Consolidated Company was recently moved from Provo to Salt Lake. This change was ordered at a meeting of the board of directors. This is one of the East Tintic Companies the control of which was recently acquired by the Chief Consolidated Mining Company.

Advices from Washington are to the effect that the house appropriations committee has cut appropriations for all western assay offices. The smallest cut made is in the appropriation for the assay office at Salt Lake City, which is put at 3,600, or only \$300 less than the estimate and the same amount less than the current appropriation.

At the regular annual meeting of stockholders of the New Quincy Mining Company, held recently, two new directors were elected. They were George L. Beemis and George W. Morgan, mining man. The other directors reelected were as follows: Arthur L. Thomas, Attorney W. R. Hutchinson, M. M. Johnson, Frank J. Hagenbarth and Herman Bamberger.

On the 24th Judge Tilman D. Johnson, of the United States district court, granted the application of the Utah Consolidated Mining Company for permission to appeal its case to the Circuit Court of Appeals. Judge Johnson several weeks ago rendered judgment in favor of the Utah Apex Company for over \$1,200,000. In granting the appeal the Utah Consolidated Mining Company is required to furnish a bond in the sum of \$1,300,000.

Official announcement is made that control of the Grand Central Mining Company has been acquired by the Chief Consolidated Mining Company. About three months ago Paul B. Hillsdale secured option on control of the Grand Central mine. At that time it was reported that Mr. Hillsdale, who is a well known mining engineer, had secured the option for the Chief Consolidated Company, but no confirmation of the deal was given at the time.

Recent returns show that the ore now being shipped from the new strike in the property of the Colorado Consolidated Mining Company is running around 30 ounces silver and from 20 to 30 per cent lead. This strike was made recently by one of the company's lessees, W. H. Clark, of Salt Lake City. Already the block has produced in the neighborhood of 400 tons of ore and shipments are being made at the rate of two or three carloads each week.

Personal Mention

Albert Roberts, field representative of the Minerals Separation Corporation, left for Butte and the northwest a few days ago.

Goodwin M. Trent, San Francisco mine machinery man, is in Virginia City, where he is installing machinery at the Hale & Norcross tunnel of the middle-mines.

Christon Vrang, well known Salt Lake geologist, has been making a several weeks' study of oil conditions in the Uinta Basin country, eastern Utah, for local clients.

Rush T. Sill, of the firm of Sill & Sill, mining and metallurgical engineers, Los Angeles, has just concluded a professional examination of properties in the Randsburg district, California.

T. T. Hall, superintendent of the Egildson Bros.' diamond drilling activities in Wyoming, with headquarters at Evanston, spent a few days in Salt Lake last week, on business and pleasure bent.

L. M. Cargo, district manager of the Westinghouse Electric Company, is over from Denver headquarters on one of his periodical trips. He declares that the mining business is picking up rapidly.

General Manager Charles Peter of the Mascot Consolidated Mines Corporation's properties in Idaho made another flying trip to the mines last week. He expects to leave for the east again on the 1st.

Dr. S. K. Loy, chief chemist of the Standard Oil Company's (formerly the Midwest Refining Company), refinery at Casper, Wyo., has been officially appointed consulting chemist of the Bureau of Mines in connection with the oil shale work.

Harold A. Linke, the well known mining engineer, who has been filling a professional engagement with the Compania de Real Del Monte y Pachuca, in Mexico, since early fall, 1920, writes that he has decided to return to Utah; that he and Mrs. Linke will leave for Salt Lake on the first of February.

M. T. Rowland, well known mining operator of Idaho, who has made his home at Nampa for several years, was a Salt Lake visitor about the middle of the month. He was on his way to the coast for a short vacation trip, the first he has allowed himself in over two years. He says that Idaho is going to make a good showing this year in its mining activities.

C. W. Young, representing the Engineering & Mining Journal, made a trip to Eureka on the 21st to attend a banquet and present the silver medals won by the miners of the Walter Fitch, Jr., Contracting Co., who broke the world's record for shaft sinking when they put down the Water Lily shaft of the Chief Consolidated Mining Company 427.5 feet in thirty-one days. The gold medal awarded by the Journal to the Walter Fitch, Jr., company, had been previously presented at a notable banquet in New York.

W. R. Calvert, chief oil geologist on the staff of the Utah Oil Refining Co., who has recently been making an investigation of the reported oil discoveries at Spokane for the government, returned to Salt Lake about two weeks ago. Regarding results of his work in the northwest he could not be persuaded to talk. On the 21st he discussed the oil situation in Utah before a meeting of engineers at the Commercial club. He expressed confidence in the future of Utah as an oil-producing state, and particularly was he confident that the eastern portion of the state would make good.

In Nearby States

ARIZONA

A new mill has been installed at the Scott property, near the Black Prince, east of Ajo, to handle the lead-silver ores.

The directors of the United Verde Extension Mining Company have declared a quarterly dividend of 25 cents a share, payable February 1 to stockholders of record January 9.

Resumption of steamshovel work at the United Verde mine has been ordered and preparations are being rushed to have the big shovels operating before the end of the month.

Work has been started on the Independence claim 10 miles south of Prescott, the contract having been let to O. O. Smith, of that city. A. K. McDaniel, of Denver, Colo., is owner of the property.

The United Eastern, at Oatman, has started to mill the ore from the Big Jim mine, the tramway from the Big Jim workings to the Eastern mill having been put into operation recently. The tram will handle up to 75 tons a day.

The Iron Cap Copper Company, one of the big producers of the Globe district, announced on Jan. 10 that the mine will resume operations about February 1. Similar announcements by other companies in the district are expected soon.

Additional men have been put to work repairing the Copper Queen smelter at Douglas, in preparation for the production of copper. Percival P. Butler, assistant superintendent of the smelter since 1916, has been appointed to the position of superintendent of the plant.

The property of the Schuylkill Mining Company, at Chloride, scheduled for sale at public auction on January 14, reverts to Frank A. Garbutt as the result of the foreclosure of his mortgage for \$342,400.72, held against the property. The mines are among the largest silver-lead-zinc mines of the state, and are opened to the 1400 level and have a large tonnage of ore in sight.

A most unfortunate accident occurred at Katherine recently when the flywheel of the new 200-H. P. engine, just installed at the Katherine mine, left its frame, instantly killing Leonard Whitney, assistant superintendent of the mine, and injuring Ernest Graham, an engineer. Mr. Whitney, who had been with the Katherine for the past six months, was formerly with the U. S. G. S. in northern Arizona.

The Inspiration Consolidated, at Miami, continues to increase its force, and rumors that the mill and concentrator will reopen soon are borne out by the general air of activity around the plant. The company is now operating two underground ore trains, which are pulling ore from the stopes and raises, which is later being conveyed to the ore bins. Work is also being resumed on the raises and intermediate drifts, preparatory to the stoping of ore.

Joe Robinson, John Sands, Steve Zubick and H. M. Caswell have formed a partnership and taken a lease on the properties of Robinson and Sands, in the Secret Pass section and expect soon to be shipping high grade gold ore to the smelter. The shaft has reached a depth of 25 feet on a four-foot vein of ore, a large part of which carries values of shipable grade, the intention of the miners being to assort the ore, the lower grades to be offered to the Tom Reed mill later on.

G. S. Holmes has been in Kingman the past several days straightening out matters of the Hackberry Consolidated Mining Company and expects to soon have every legal entanglement smoothed out. The Neagle sale of the property has been taken care of by Mr. Holmes and the other legal difficulties

will be cared for in the same way. As soon as these affairs have been cared for an effort will be made to clarify the situation and start things going on the big silver property.

W. P. Carr and associates, who are working on the property under option to I. M. George and associates, reports that the ore showing continues to be as good, if not better, than when first entered. A shipment of ore that will run about \$500 per ton will soon be sent out to the smelter, the lower grade being allowed to remain on the dumps for future milling operations. The ore opened in one of the stopes is very rich, running above 600 ounces silver and nearly \$100 in gold. This ore was opened by people operating the mine some years ago, but overlooked by them.—Kingman Miner.

COLORADO.

The annual joint meeting of the Colorado Metal Mining Association and the Colorado Chapter of the American Mining Congress was held at the State Capitol, in Denver, during the week of January 17, 1922.

According to the Silverton Standard a recent shipment from the Slide mine, in the Stony Pass section, brought returns of about 140 ounces in silver and one-half ounce in gold to the ton. Work there will be discontinued until early in the spring as winter operation, especially in the tunnel, are seriously handicapped by inadequate protection from snow and cold weather.

The Nina Allen Mining company, A. F. Allen, president, has cleaned out and retimbered the adit tunnel on the Homestake group, in Gamble Gulch in the Perigo section, and is drifting on a two-foot vein of free milling ore averaging from \$25 to \$40 a ton in gold and silver. A rich streak in the vein is classed as high grade and is carefully sacked. Recent tests on this ore gave results of 100 ounces of gold to the ton. The Nina Allen is a southern Colorado company.

IDAHO.

Five feet of carbonate ore, principally lead oxide, was uncovered in the drift on the 300-foot level of the Lookout Mountain property, located near Kellogg. This marks the third consecutive shoot of ore found on this level.

The Boulder Creek Mining Company, in which John Peter and Thomas King of Sandpoint, are large shareholders, has purchased machinery for the erection of a mill on its property, 20 miles north of Sandpoint on Boulder creek.

The Auxer Gold Mining Company, in running a tunnel to reach its Chicago and Boston veins, struck a blind vein with two gold-bearing ore bodies 12 feet apart, according to M. B. Dunkle, secretary-treasurer. The property is near Hope. The first ore is from six to 12 inches wide and assays \$8 in gold. The second is 10 to 12 inches wide and is quartz with more iron and apparently better values.

M. H. Sullivan, general manager of the Bunker Hill smelter, at Kellogg, says that in future the smelter will be able to refund the duty of 3-4 cents a pound to Canadian shippers, which hitherto has been held out of settlements. On ore containing 50 per cent lead this will be an increase of \$7.50 a ton in the returns they will get from the Bunker Hill smelter. Mr. Sullivan feels this will be acceptable news to Canadian shippers. Another furnace was blown in several weeks ago, making two now in operation.

The value of gold, silver, copper and lead mined in Idaho in 1921, according to estimates of the United States

geological survey, was \$15,208,000, a marked decrease from the value in 1920, which was \$31,170,176. As a result of the collapse of the metal market, several of the copper, lead and zinc mines were closed. Only the high price of silver prevented the closing of the large mines of silver-lead ore. The mine output of gold in Idaho in 1921 was valued at about \$497,000, as compared with \$485,590 in 1920.

The Bunker Hill & Sullivan Mining Company at Wardner is installing a 150-horsepower electric hoist. Each drum will hold 6500 feet of seven-eighths wire cable. The hoist will be equipped with a Maag cast steel herringbone gear, capable of transmitting 200 horsepower. Each drum is equipped with power and hand brakes. The clutches are of the multiple disc type. Indicators and safeties are of the latest type Welch combined dials, safeties and indicators. Safeties will operate by releasing air from brake engines, allowing the brakes to be quickly applied, and also at the same time by cutting off the power.

"What is regarded as ore of a shipping grade is appearing in the No. 3 tunnel on the Gettysburg claim of the Independence Lead Mining Company, one mile from Mullan, in the Hunter district," said H. B. Kingsbury, president, recently. "It is two and a half feet wide. We have followed ore of a milling grade for the last 80 feet. Several weeks ago a streak of higher grade appeared. Its width has increased as the drift has been advanced. The milling ore is 12 feet wide at one point in the drift. The development is in the tunnel about 300 feet from its portal. Harry W. Ingalls of Mullan, has been appointed manager."

NEVADA.

According to the Reno Journal the Bank of Wells, owned by Badt Bros., prominent stockmen of Wells, has closed its doors by order of the state banking examiner. The bank is said to be solvent and will be speedily reorganized without loss to the depositors.

The Rochester Silver Corporation milled 5,083 tons of ore in December which yielded bullion worth \$60,540.37 with an operating profit of \$18,262.35. Mill heads assayed 1.33 oz. gold and 10.94 oz. silver. The bullion contained 654.6 oz. gold and 46,077.1 oz. silver.

The Idaho Gold Corporation, recently incorporated in Utah by a number of Salt Lake mining men and capitalists, has been reincorporated in Nevada and will have its headquarters in Reno. George Graham Rice is said to be the power behind the throne in this venture.

Ore is being encountered in such liberal quantities at the property of the Super Six Mining Company at Royston that an early shipment of a carload is promised, according to the announcement of W. H. Wilson, who is actively interested in the development of this well-known Royston company.

Development of the property of the Cottontail Mining Co. at Rebel Creek, Humboldt county, has progressed so satisfactorily that the company has secured a small mill which is to be erected without delay. C. K. Jarvis, general manager, was in Reno recently to arrange for shipment of the mill equipment.

A gasoline hoist has been purchased and will be installed at the Wardner property, nine miles north of Luning, which was purchased about four months ago by Dr. Frederick Bass of San Francisco for himself and associates. A head-frame is now being built and when the hoist is

installed the shaft, now 50 feet deep, will be sunk to the 150-foot level.

William H. Pitts, of Pioche, who recently secured a lease on a sector of the upper workings of the Prince Consolidated Mine, has commenced active mining operations, and a force of men are mining ore in the fissure stopes on the third level of the mine. J. H. Hedges, present superintendent of the company and Frank Goodman are associated with Mr. Pitts in the enterprise.

One of the largest single contracts ever placed for cyanide has been made by the Nevada Mine Operators' Association. It covers the requirements for 1922 of all the cyanide mills in the state and will amount to approximately 2,500,000 pounds. This is said to be about 5 per cent of the entire consumption of cyanide used in metallurgical work in the United States. The product contracted for is of a lower grade than has been previously used in Nevada.

Three feet of \$100 ore is exposed in No. 4 tunnel at the Betty O'Neal mine and the entire face of the drift is in ore, with no hanging wall in sight. The strike was made after the drift had been turned slightly from its course toward the foot-wall. The adit is being advanced south in a body of ore that was previously opened in No. 3 tunnel, 200 feet higher. Connections are being made by raises from the 150-foot shaft level to tunnel No. 4 and thence to tunnel No. 3. Values are in silver.

WASHINGTON.

The Northwest Mining convention, which will be held at Spokane, February 14 to 18, promise to be one of the best attended in several years.

A dividend of between 1 and 1 1-4 cents per share will be distributed to shareholders of the Knob Hill company, following the sale recently of the company's mining property at Republic.

Instead of one ore body, the Chloride Queen management is now after two ore bodies, according to J. C. Haas, mining engineer of Spokane, Wash., and president of the company. The property is north of Colville.

W. T. Burdette, age 72, pioneer mining man and merchant, at Locke, died recently. Mr. Burdette was the founder of the mining camp at Cornucopia, Ore., of the same name, having discovered several of the principal properties of that district.

H. F. Weirum, general manager of American Mineral Production Company, operating the Allen magnesite quarry at Valley, 50 miles north of Spokane, announces that operations will be resumed immediately in order to fill orders received for their products.

GETS MONEY TO OPERATE.

Philipsburg, Mont., Mail:—J. E. Itter has returned from a business visit to New York. Mr. Itter brings good news concerning future operations at the Itter group of mines in the Frog Pond district. He states that development work is to be vigorously prosecuted and by next summer he hopes to see Frog Pond one of the busiest mining camps in the West. During the past week he started several teams for the Frog Pond district with equipment and supplies for his camp and departed with a crew of men to help move the supplies in and to resume work at the mine.

Petroleum Notes

The Wyoming Oil World, of Casper, Wyoming, has changed its name to the Inland Oil Index.

At the recent sale of oil leases in the Osage Indian reservation in Oklahoma, leases on 230 tracts brought \$7,267,600. The Sinclair and Cosden interests were the principal buyers. One tract sold for \$800,000.

There are six new rigs being erected in the Lost Soldier field, six new rigs in the Mahoney Dome, three in the Ferris field and the General Petroleum of California is making preparations for an active drilling campaign in the spring.—Rawlins Republican.

Test of the Midwest Oil Co., 14 miles west of Cortez and 6 miles east of the Utah line, in the extreme southwestern corner of Wyoming, is fishing at 300 ft. It is reported that several more tests will be started in the same locality early in the new year.

Nearly a billion dollars will have to be spent and over one hundred and thirty-five thousand productive acres acquired and operated in 1922 if this country is to maintain its present oil production, according to estimates made by J. C. Donnell, president of the Ohio Oil company, who based his statements upon experience gained in the drilling and management of 42,000 wells.

It is reported that the Douglas Community Club of Douglas, Wyoming, is seriously considering the raising of a fund of \$25,000 to be offered as a bonus for the discovery of a commercial oil well in the trade territory tributary to Douglas. It is stated that the Big Indian Oil & Gas Co., will start drilling on the La Prele structure west of Douglas just as soon as the patents to the land are issued.

The Ohio Oil Co., has abandoned its efforts to test the Embar and Tensleep sands in its No. 10 Phelps on sec. 19-46-98, Grass Creek field, Wyoming, where it had some casing in the holes at 3,097 feet. After failing to recover the casing or to sidetrack it, the company decided to plug back to the Morrison sand, in which it had commercial production and will drill down its No. 13 LU Sheep Co. well, which is in good shape and which was the discovery well in the Morrison sand.

The annual stockholder's meeting of the Uinta Oil Exploration Company was held in Denver on the 10th. Over seven-eighths of the outstanding stock was represented. The following Directors and Officers were elected: R. J. Walter, president; Geo. de L. Emery, first vice president; E. D. White, second vice president; Frederic J. Walter, secretary-treasurer; Walt Thomas, J. C. Pritchett and Allison Stocker. The company has two standard rigs in the Uinta basin, where it has very large holdings of oil, ozokerite, gilsonite and oil-sand lands.

Pipe-line companies deduct 3 per cent from the oil gaged to allow for impurities and loss. The fairness of this figure has been questioned, and in order to arrive at a fair basis of deduction upon which to compute the royalties due the government from operators on public lands, samples of oil from points scattered throughout the Salt Creek field in Wyoming, have been collected by Bureau of Mines engineers, and submitted for analysis. Although the results indicated that the deduction of 3 per cent was large, it has been decided that in fairness to all concerned similar sets of samples should be collected at other seasons of the year and final conclusions be

drawn from all the data. The results of this work will be published later.

The oil shale exhibit, staged by the Bureau of Mines at the recent exposition of the American Mining Congress in Chicago, attracted a great deal of attention. This exhibit was designed to educate the public as to the nature of oil shale and as to what might be expected from it. Two assay retorts were in operation, actually producing oil from Utah and Colorado shales. Besides the collection of photographs, shale specimens, shale oil samples and retorting models sent direct from the Boulder and Salt Lake City laboratories, a large amount of oil shale of different types was supplied and exhibited through the co-operation of the Debeque, Colo., Chamber of Commerce. At the conclusion of the exhibit these shale samples together with a small quantity of shale oil were turned over to the Field Museum in Chicago to form the basis of a permanent oil shale exhibit.

O. L. Smithers, an experienced oil driller, was in Brigham City recently and while awaiting instructions from his company, the Zion Asphalt Company of Salt Lake City, stated that his visit was for the purpose of reporting to the Zion Asphalt Company that in drilling for asphalt he had discovered a good grade of oil on the Lake shores near Rozell, in western Boxelder county, coming up through the salt water. He also stated that in drilling he passed through a layer of hard white stone and later struck green sandstone at 200 feet, where pockets of oil were encountered, and some of it forced its way up the pipe to the top, coming out in large bubbles, showing a good grade of oil. Smithers also stated that he had a contract to drill a well 1200 feet deep and expects to start operations later in the year on the deep well. It is said that some 100 oil wells will be drilled during the coming season in the vicinity of Rozell.

BITUMINOUS COAL NEAR FALLON.

Fallon, Nev., Jan. 24.—E. P. Osgood, the geologist, has received samples of the coal discovered on the Cirac ranch near Fallon. He has passed it up to the State University and the verdict is that it is bituminous coal. Mr. Cirac is now sinking a shaft to determine whether or not a vein of this coal can be found on his place. If so it will add greatly to the resources of the Lahontan Valley, as the samples show a coal of very high grade. It has long been known that there is a deposit of coal, said to be highest in heat units of any coal known in the United States, north and east of Fallon. It is such an inaccessible point that the cost of bringing it into market is almost prohibitive. So far the Lahontan valley has shown every earmark of an oil field except oil in commercial quantity. One of the largest and best salt deposits in the country is at the southeast; gas has shown at many points; oil seepages occur in every well put down and the hills beyond Fallon are made up largely of oil shale. Large beds of diatomaceous earth abound at many points.

The work of remudding the Syndicate Oil Company's well is progressing. It is said that as soon as the Syndicate can sign up more of the land around its holdings on the Jones & Jewell ranch, drilling will be resumed. The remudding of the hole is to hold it against cave-ins and refilling.

The meeting of the Diamond Oil Company will be held in Reno on Feb. 10th. It is said that there is a move on foot to elect at least part of a new board of directors, enough at least to effect a change of management.

SALT LAKE MINING STOCK QUOTATIONS

The range of the market from January 19th, to January 27th, inclusive, Quotations furnished by J. A. Hogle & Co., direct wires to all leading markets, 169 So. Main St., Salt Lake City, Utah, and ground floor of Eccles Building, Ogden, Utah, and Pocatello, Idaho.

Stock.	CLOSING							Stock.	CLOSING						
	Open.	High.	Low.	L. S.	Bid.	Asked.	Sales.		Open.	High.	Low.	L. S.	Bid.	Asked.	Sales.
Alta Mich.					.01	.03		Keystone					.15	1.00	
Antelope Star								Kennebec	.05	.08	.05	.08	.07	.10	2,250
Alta Con.	.08	.08	.05	.08	.07	.09	44,286	Lehi Tin.	.02	.02	.02	.03	.02	.03	30,500
Alta Tiger							6,000	Leonora	.01	.01	.01	.01	.01	.01	6,000
Albion Cons.	.10	.11	.08	.10	.10	.11	11,750	Logger						.01	4,000
Am. Con. Cop.	.01	.03	.01	.03	.03	.04	62,500	Lynn Big Six	.16	.22	.16	.20	.21	.25	29,277
Alta Tun.	.17	.19	.16	.17	.17	.18	59,900	Monzonite						.02	
Bullion	.02	.02	.02	.02	.01	.03	8,500	Mammoth						.50	
Big Hill	.02	.02	.02	.02	.02	.03	1,000	Miller Hill						.02	
Big Cot. Coal.					.06	.07		May Day					.01		
Peaver Cop.						.01	2,000	Mason Valley					1.10		
Bay State	.05	.05	.05	.05	.03	.10	1,000	Moscow						.10	
Black Metal	.08	.10	.08	.10	.10	.12	1,500	Mich. Utah	.31	.37	.25	.36	.35	.36	82,800
Fingham Gal.	.01	.02	.01	.01	.01	.01	84,000	New Quincy	.05	.05	.04	.04	.04	.04	58,700
Cent. Eureka						.02		Nalldriver					.06	.35	
Cedar Tallis								O. K. Silver						.05	78,266
Clb. Rexall	.16	.27	.16	.27	.27	.30	2,700	No. Standard	.05	.06	.04	.04	.04	.05	
Colo. Con.	.05	.05	.03	.03	.03	.04	3,100	O. K. Silver							
Crown Pt.	.02	.02	.02	.02	.02	.03	3,500	Ophongo		.01	.01	.01		.01	8,000
Cardiff	1.00	1.05	1.00	1.05	1.10	1.10	1,200	Plutus	.16	.28	.16	.26	.27	.32	1,500
Croff						.01		Prince Con.	.12	.14	.08	.11	.10	.11	38,900
Cott. King						.01		Pioche Bristol		.01	.01	.01	.01	.01	23,000
Daly					1.00	3.00		Price Mining	.04	.05	.04	.05	.04	.05	4,000
Daly West					1.85	2.50		Provo	.01	.02	.01	.02	.01	.02	8,000
Dragon					.05	.08		Rico Arg.							
Oemiljohn Con.						.01		Reeds Pk. C.					.01	.02	
Emma Sul.	.02	.02	.02	.02	.02	.02	115,700	Rico Well							
Empire Mns.	.02	.02	.02	.02	.02	.03	3,000	So. Standard	.10	.10	.10	.10	.10	.12	1,000
East. Prince						.01		Sells	.04	.04	.02	.02	.02	.03	24,100
E. & B. Bell					2.25			Syndicate	2.27	2.27	2.10	2.10	2.10	2.15	16,000
Emerald	.03	.03	.03	.03	.02		2,000	Sil. King Coal.	.53	.56	.53	.56	.01	.01	4,200
Eureka Mns.	.05	.05	.05	.05	.04	.05	3,000	Sil. King Con.	.02	.02	.01	.01	.01	.01	4,200
E. Crwn Pt.	.02	.02	.02	.02	.02	.02	2,000	Sioux Mns.					.01	.01	
E. Tin. Coal.	.01	.01	.01	.01	.01	.01	19,500	Swansea Con.					.01	.01	
E. Tin. Con.					.05	.08		So. Hecla					.30	1.05	
East Antelope						.01		Silver Shield	.01	.02	.01	.02	.02	.05	7,500
Eureka Lily	.07	.08	.07	.08	.08	.09	4,400	Tecoma						.01	
Eureka Bul.	.03	.04	.03	.04	.04	.04	50,000	Tar Baby	.02	.04	.02	.03	.03	.03	11,500
Gold Chain					.04	.07		Tintic Central	.01	.01	.01	.01	.01	.01	1,000
Grand Cent.	.45	.45	.45	.45	.40	.45	500	Tintic Stand.	2.00	2.02	1.90	2.02	2.00	2.05	6,000
Great West.						.05		Uncle Sam		.01	.01	.01		.01	5,000
Hamburg Mns.								Utah Con.		.01	.01	.01		.01	13,000
Howell	.05	.05	.04	.04	.04	.05	7,000	Union Chief					.01	.05	
Home Run						.01		West Toledo	.02	.02	.02	.02	.02	.02	4,000
Iron Blossom	.17	.21	.17	.21	.20	.22	10,170	Walker Mng.	2.75	2.75	2.75	2.75	2.55	2.70	250
Indian Queen						.01		Woodlawn	.11	.11	.08	.08	.07	.11	5,900
Iron King	.07	.07	.07	.07	.07	.11	1,000	Yankee Con.	.01	.02	.01	.02	.01	.01	1,000
Judge M. & S.					2.40	3.00		Zuma	.04	.09	.04	.07	.07	.08	18,100

EASTERN STOCK QUOTATIONS

Anaconda Cppper	49 1/2 @ 50
Butte & Superior	26 1/2 @ 27 1/2
Chino Copper	28 1/2 @ 28 1/2
Ray Consolidated	15 @ 15
Utah Copper	63 1/2 @ 63 1/2
Bingham Mines	13 1/2 @ 14
Daly West	2 @ 2 1/2
Mason Valley	1 1/4 @ 1 1/4
Utah Apex	2 1/2 @ 3
Utah Cnsolidated	1 1/4 @ 2

ASSESSMENTS PENDING

Selma Mines Co., 1c. a share. Delinquent February 10. Sale day March 6.	
Bullion Mining Co., 1/2c. a share. Delinquent Jan. 31. Sale day February 20.	
Three Kings Con. Mining Co., 1 1/2c. a share. Delinquent Feb. 11. Sale day March 14.	
Neva Mining Co., 1-5c. a share. Delinquent Feb. 18. Sale day March 18.	
Lehi Tintic, 1c. a share. Delinquent Jan. . Sale day February 3d.	
Zuma Mining Co., 1c. a share. Delinquent Jan. 17. Sale day February 9.	

ORE SHIPMENTS

Ore shipments from the Park City district for the two-week period ending on the 20th totaled 4,007 tons, as follows:

Judge Allied Companies	1,855
Ontario Silver Mines	609
Silver King Coalition Mines	1,543

Total tons/4,007

During the two weeks ending on the 20th the mines of Tintic sent to market 297 carloads of ore, as follows:

Tintic Standard	110
Chief Consolidated	77
Iron Blossom	15
Victoria	23
Eagle & Blue Bell	16
Colorado Consolidated	12
Grand Central	14
Bullon-Beck	4
Gemini	4
Dragon Consolidated	8
Showers	2
Centennial-Eureka	3
Gold Chain	1
Sunbeam	1
Swansea Consolidated	5
Tintic Drain Tunnel	2
Mammoth	2

Total carloads297

METAL MARKET QUOTATIONS JANUARY 23d.

Silver	99 1/4c.
Silver (in London)	34 3/4d.
Copper	13 1/2 @ 14c.
Lead (New York)	\$4.70 @ 4.80
Spelter (E. St. Louis, spot)	\$4.70 @ 4.75

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The Salt Lake Mining Review

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SALT LAKE CITY, UTAH, FEBRUARY 15, 1922

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Big Park City Mines Merger to Have Nucleus in Reorganization of Daly West

In reviewing the situation at Park City in the January 15th issue of the Mining Review, reference was made to a report that a gigantic merger or consolidation of properties in that camp was under way and that official announcement of the report might soon be expected. The merger, as outlined at the time, was reported to include the Park Utah, the Daly, Little Bell, Daly-West and Daly-Judge (Judge Mining & Smelting) possessions. Additional evidence that the undertaking is being worked out along the lines reported is found in the following, taken from the Boston Commercial of January 28th:

The charter of the Daly-West Mining Company expiring Feb. 14 (yesterday), the directors of the corporation have recommended that the name be changed to the Park City Mining & Smelting Company. They also suggest that the new corporation be formed under the laws of some other state than Colorado.

The statement of the directors, in part, follows: "Your directors recommend that a new corporation be formed under the laws of that state which has corporation laws most favorable for mining enterprises. The laws of Colorado, under which the company is now organized, do not permit incorporation for more than 20 years, and have other features which can be improved by incorporation elsewhere.

Expansion Provided For.

"The directors also recommend that the new incorporation be made large enough to permit the acquisition of additional property when found to be to the advantage of the company. They believe that this can best be done through a corporation with shares of nominal or without par value, and recommend that the new corporation be thus formed, present stockholders to receive at least share for share of stock in the new corporation, with sufficient additional shares provided for and left in the treasury of the company to permit the expansion mentioned above, or to be otherwise issued should it ever become advantageous or necessary to do so.

"Your directors further recommend that the name of the new corporation be Park City Mining & Smelting Company."

While "the best laid plans of mice and men," don't always work out as one might expect, there is enough information in the above item to make it reasonably certain that the proposed "Park City Mining & Smelting Company" has been decided on as the vehicle through which the great merger will be finally rounded out. It is possible, of course, that the properties of the Park Utah company may not be included in the merger, as that undertaking is developing into a mighty big proposition by itself. Also, it is separated from the other properties mentioned by the Ontario Silver Mines Company's possessions, though the latter company owns much ground along the line of its three-mile drain tunnel to the east of its main holdings, and through which the Park Utah has operating privileges, because of half ownership in the tunnel itself by the Daly Mining Company, which is controlled largely by the same interests operating the Park Utah.

It may seem premature, therefore, to even suggest it at this time, but there is a well-grounded impression in usually well-informed mining circles that the day is coming when all of the present known mines extending from the mouth of the Ontario drain tunnel clear through the dis-

trict to the head of Big Cottonwood canyon, will be gathered in to one organization. And, if that proves to be the case, it may just as well be accomplished through the proposed Park City Mining & Smelting Company as through any other channel.

Significance of Daly-West Reorganization

Much significance is attached to the proposed plan of reorganization of the Daly-West company, which suggests a capitalization with a large number of shares of nominal or no par value. The Daly-West, with its old charter expired, is the logical groundwork for such a corporation as seems to be contemplated; so that, whether the Park Utah, the Ontario, or any other property in the district that would tend to round out the mammoth undertaking, should fail to be included in the start, there is logical reason to believe that ultimately the whole region described will become identified with the great enterprise.

STRIKE IN CON. MASCOT MINES

Previous to his departure for the east about the first of the month General Manager Charles Peter, of the Consolidated Mascot Corporation, operating twenty miles north of Hailey, Idaho, returned from the mines with 200 pounds of ore that had just made its appearance in the face of the main operating tunnel. The strike was made only a few hours before Mr. Peter left the property, so he was without knowledge of its real import and extent. As he was compelled to go east on the first of the month, no additional information concerning the discovery has so far been obtainable. Some of the ore brought down was a high grade, close-grained galena that looked as though it would easily carry 65 per cent lead and probably 40 ounces of silver per ton. A general sample of material, just as it was broken down, carried about 35 per cent lead and 16 ounces silver.

At the point in the tunnel where the fissure was tapped is more than 1,000 feet from the portal and beyond the point where the tunnel swerves to take an easterly course through the patented claims of the mine. The ore came in at the top of the face and was dipping easterly with the vein and it had not been cut in the bottom of the tunnel when Mr. Peter left the mine for Salt Lake.

The significance of the strike lies in the fact that it proves the contention that the ores developed in upper workings go down to the main tunnel level, insuring the permanency of the mine at depth. Many other new disclosures are promised during this year's operations at the property.

FIGHT FOR BETTER FREIGHT RATES ON METAL ORES FROM UTAH MINES

Testifying before the Interstate Commerce Commission at Washington, D. C., on the 21st of last month, A. G. Mackenzie, secretary of the local branch of the American Mining Congress, explained the ore shipping conditions which confront the mine operators of Utah in a most concise and illuminating manner. Such testimony as that given by Mr. Mackenzie ought to have substantial weight in determining favorable action for relief on the part of the commission. Extracts from Mr. Mackenzie's testimony show the painstaking care he used in elucidating the situation in Utah, as will be seen from the following:

"In the ten year period 1912 to 1921, inclusive, mines of the State of Utah produced 3.9% of the gold, 19.7% of the silver, 11.9% of the copper, 15.8% of the lead and 1.6% of the zinc produced in the United States. The gold is obtained in almost every instance as a by-product. With the exception of one camp, copper is also obtained as a by-product. Zinc is produced in recoverable form by only a few mines. With the exceptions noted, the metal mining industry of the State is devoted almost exclusively to lead-silver ores.

"The ore tonnage averaged more than nine and one-half million tons annually in the ten year period. The 1921 tonnage was only about one-fifth of the average for the period.

"As metal mining is conducted in Utah, the ore producers sell their ore to local smelters which settle with them on the basis of current market quotations. The smelters deduct from the gross value of the ore the amount of the freight charges from mine to smelter, the cost of treatment, the estimated amount of slag losses, cost of shipping the bullion to refiners and cost of refining and marketing the metal. These deductions leave the ore shipper only about half the gross value of his ore with which to meet all of his mining and other costs.

"Exhibits presented in this case were obtained from official public records or from the original sources whence the public records are obtained. They show that as compared with the year 1913 the number of ore producers of Utah in the year 1921 amounted to only 60%, the tonnage to 28%, the number of employees (compared with 1916, as no prior records were kept), to 42%, the average wage to 121%, metal prices to 100.6%, ore rates to 125% and bullion rates to 207%. Effective January 16, 1922, wages were reduced to 107% as compared with 1913. Since August 11, 1921, the bullion rate has been 155% of the 1913 rate.

"Figures for the Utah Copper Company are separately shown for the reason that this property is operated in such a way as to make complete comparison with other mines of Utah impossible. This property has been completely closed down since April 1, 1921, and the company sustained a loss of approximately \$2,025,000 in the year 1921.

"Almost all of the ores of Utah are the kind known as low grade, complex ores; that is, ores of comparatively small metallic contents and which contain more than one metal. Increasing costs of the last few years have made it impossible to operate most of these mines and they have shut down. One of the smelters shut down in July, 1921, and the others are operating at greatly reduced capacity. Mines now operating are those with ores sufficiently rich in silver to offset losses on the lead and other metallic contents. Conditions have forced those mines now operating to practice what is known as preferential mining; that is, to extract only ores of the highest grade. This is bad mining practice. It means a loss of a large part of his ores to

the mine owner, the loss of tonnage to the railroads and smelters, and the permanent loss of large quantities of metal that can never be extracted.

"Metal quotations, with the exception of silver, are at substantially the levels that prevailed for many years prior to the war. The price of silver is fixed by government statute at a little less than \$1 an ounce for a limited time. Except for this silver price, fixed by the Pittman Act, all of the metal mines of Utah would have shut down months ago. Silver almost invariably occurs with lead in Utah ores. Those mines in which lead and copper are the predominating metals are all closed down.

"The metal market, with the exception above noted, is not likely to change greatly for some time. A large copper surplus is still above ground and even with copper buying resumed, the price is not likely to go above the pre-war average. Lead may respond somewhat in price to the imposition of the increased tariff proposed in the Fordney Bill, but cannot be expected to go much, if any, above 5 cents a pound, due to the supply and the nature of its use. All the metals produced in Utah compete in world-wide markets and the ore producer is wholly unable to control in any way the price of his product.

"The only factor in the situation that is now materially out of line with the year 1913 is the freight charge. It is a considerable item, representing about 22% of the total production cost.

"It will help an understanding of the relative importance of mining in Utah to note that 30% of all the wage earners covered by workmen's compensation insurance in Utah are mine employees. The number of metal mine employees has decreased from 16,505 in 1917, to 5,690 in 1921, a decrease of more than 65%. The decrease of 1921 over 1920 is more than 24%. The camp of Bingham alone has decreased in population from 8,000 to 2,500. Three underground mines at that camp that normally employ more than 1,000 men have only a total of 135 employed today. The Utah Copper mine has about 150 employees out of a force that normally runs about 6,000.

"As the freight rate applying directly to ores, to say nothing of the extent to which freight rates are reflected in the cost of mine supplies, is such a considerable item in mining operations and, as has been pointed out, is the only item substantially out of line at the present time, relief through reduction of freight rate is necessary before resumption of operations may be expected.

"The attitude of Utah ore producers is to co-operate with the railroads and in view of the fact that the railroads have handled tonnages greatly in excess of that for the year 1913, it is assumed that they have facilities to handle a tonnage at least equal to that of 1913.

"It is our opinion that the railroads would themselves profit financially through the re-establishment of rates which would move out the large tonnage of ore which cannot move under present rates. The exhibits in this case indicate, and it is the opinion of Utah shippers, that a heavy increase of tonnage would immediately follow a reduction of rate. The mine owners are naturally anxious to have their ores moving, as mine property deteriorates rapidly when idle and a shut-down in the case of a mine is much more undesirable than in the case of almost any other kind of property."

A Paris woman predicts the end of the world is coming on April 1. We print this information for the benefit of the man who usually puts off paying his subscription until along the latter part of that month.—Hailey Times-Miner.

WILL THE NEXT GOLD MINING REVIVAL START IN THE OATMAN, ARIZ., DISTRICT?

By H. E. Davis*

"Gold!" The most compelling and alluring word in any language. The word most closely linked with world development; the word, in fact, which has been the main-spring actuating all great pioneer movements.

Late in 1914 the cry "gold" began to attract the public to Oatman, in the southwestern edge of Arizona. The United Eastern mine was in the making, and its shares were acquired at prices ranging from 25c to 50c per share by a few hardy ones. As the mine grew, the excitement grew. Scores of shafts were started in 1915, and engineers and geologists nationally famous visited the district and unanimously pronounced that a number of big mines were to be made in the district.

But the gold did not lay on top of the ground. To find it required search, hundreds of feet beneath the surface. The majority of the companies starting work merely had sufficient funds to enable them to start sinking shafts. They depended upon stock sales to the public for funds with which to prosecute their search for gold. To sink shafts and to drive exploration laterals required months and months.

How the Camp of Oatman Went Down

About this time world war demands sent booming the prices of copper metal; unheard of profits and dividends by copper producers began to be the rule and the public, always fickle, turned from the future promise of Oatman gold mines to the NOW of the old and new copper camps—from the unexciting drudgery of prolonged, painstaking search for gold to the excitement and allure of the seething copper camps.

Deprived of the financial support of the public, the new Oatman companies ran out of funds and one by one, and finally by groups, they began to suspend operations, with fully 95 per cent of them not having carried their preliminary development work to the point whence they could even begin to LOOK for ore. No company in the district suspended operations because it had proved by exploration that its ground was without merit.

Then came our own participation in the war; steadily mounting costs and as steady depreciation of the value of gold, until gold mining ceased to be attractive, and it came to be a serious question in the minds of officials of producing gold mines whether they should continue production as a matter of patriotism, or close down in order not to market at half price the gold reserves belonging to their stockholders. It was impossible to finance development of gold mines, so the exploration of the Oatman district remained unaccomplished, save for sporadic, short-lived campaigns as this or that company would secure a small amount of money. However, through this kind of work several companies reached ore, but having no milling facilities were unable to finance the work of blocking it out and ascertaining its full extent.

The Tom Reed and the United Eastern, the two big mines, continued steadily at work developing and milling ore and turning out bullion.

Oatman United Disclosures a Vindication

One small company started levying assessments along in 1917, and through the loyalty of stockholders was able

to conduct continuous, although small-scale development. As a result of this work the cry of "gold" is again coming from the Oatman district, and those geologists who claimed that there are a number of undeveloped big mines in the district are beginning to find their vindication. That company is the Oatman United, and now comes the news that diamond drilling operations have proved the existence of a block of ore of a known continuous length of more than 425 feet, a height of fully 300 feet, a thickness ranging from about two feet at the western end to 26 feet toward the easterly end of the proved zone, and values ranging from \$10 to \$15 across narrow portions to an average of \$89 per ton across 20 feet of vein.

How much further to the east and west and upward and downward this ore body extends is yet to be proved. Its greatest known depth is some 900 feet below surface, and it has been proved thence for a height of 300 feet.

The great United Eastern main ore shoot, whence about \$3,800,000 has been paid in dividends since 1917, was about 750 feet in continuous length, 500 feet in height, and 25 feet average width, and still is far from being exhausted. The Oatman United is beginning to compare with Eastern, according to reports from the diamond drilling operations.

Making Milling Arrangements.

Thanks to the Tom Reed Mining Company, some of the smaller Oatman companies which have pay ore available, but which cannot finance further development unless they can turn this ore into money, are being provided with custom milling arrangements. The United American and the Telluride companies have signed contracts whereby each will put a minimum of 25 tons per day through the Tom Reed mill; the Gold Dust Company has applied for a like contract, and it is believed that the Gold Ore and the Oatman United Companies will soon apply for like contracts. With these companies milling the good grade of ore which they have available, they can resume systematic exploration without requiring, as heretofore, the financial aid of the public.

Engineers familiar with the district believe that the underground exploration thus made possible will bring into being other important mines, and again bring to the attention of the world the fact that only a few miles from Los Angeles is the center of American gold production.

ADRA MINES AT ATLANTA REOPENED

Frank A. Crampton who is operating the Adra Mines at Atlanta, and J. S. Ward, superintendent of the property, were in Pioche from the mines, a few days ago, exhibiting some of the highest grade silver ore that has ever been found in that Nevada district. This ore was taken from one of the old stopes which has been recently opened and retimbered. Mr. Ward believes it is from this stope that some of the richest ore from the mine was taken in early days.

The Adra shaft has been retimbered and the old workings entered and cleaned out. In the work of rehabilitating the mine, many faces of very good ore have been discovered and work is now progressing in order that shipments may go forward as soon as the severe winter weather abates. The high grade ore exhibited by Engineer Crampton is reminiscent of the early days, when, according to old-timers, Felix Knight would make trips from Pioche to Salt Lake City with ox teams and return with a small fortune each time.

"Treat 'em rough" was a good war slogan, but we fail to understand why the laundries should adopt it.—Baltimore Sun.

*Mr. Davis is one of the best-known western mining writers and engineers, has been through all the great western mining excitements since the Tonopah days, and is regarded as one of the best-posted men on the general geology, minerology and individual properties of the Oatman district. He was mining editor of the Goldfield News in early Goldfield days.

Coal Resources of Wasatch Plateau

In order to obtain information for use in the proper apportionment of government lands into leasing units under the terms of the Leasing Act of 1920 a party of the United States Geological Survey, under the direction of E. M. Spieker, made a detailed study last summer of the thickness and distribution of the coal beds and the quality of the coal in the Wasatch plateau, Utah. The party included H. I. Smith and G. J. Salmon, mining engineers of the United States Bureau of Mines, who studied the engineering problems bearing on the mining of the coal; W. P. Upton, Jr., G. F. Harley, and F. W. Downey, topographic engineers; and E. M. Spieker, W. W. Boyer, and R. H. Haseltine, geologists. Most of this coal field is on the Wasatch plateau, between 7,000 and 10,400 feet above sea level and between 4,000 and 5,000 feet above Castle valley, to the east. The area most thoroughly studied and mapped lies in the eastern part of the plateau, between Wildcat canyon, in T. 13 S., R. 8 E., and the mouth of Huntington canyon, in T. 17 S., R. 7 E.

The Wasatch plateau is for the most part a broad upland, whose surface shows smooth, gentle slopes but whose eastern front is marked by steep sandstone cliffs, which rise 1,000 to 2,000 feet above the adjacent Castle valley. These cliffs are in places breached by the deep canyons of streams which extend back as far as 35 miles from the front of the cliffs.

The coal-bearing strata, which belong to the Mesaverde formation crop out in a sinuous line along the bold escarpment at elevations ranging generally from 700 to 1,200 feet above the bordering lowland.

The difficulty of bringing the coal down from its outcrop in the steep headlands that mark the outer line of cliffs has generally discouraged development, and consequently all the mines along the escarpment are in canyons whose gradient is not very steep. At such places the mining camps of Castle Gate, Mohrland, Hiawatha, Wattis, and the towns of Spring Canyon and Pleasant Valley have been established, but even at these places it has been necessary to construct long and expensive tramways to reach most of the mines on the east escarpment of the plateau. There are few places on the escarpment at which the coal beds outcrop at tippie-height on a possible railroad grade, but in some of the small canyons tributary to Huntington canyon it will be possible to reach the outcrop of the lowest coal by railroad.

Field's Development Only Just Begun.

The development of the field has merely begun. Even some of the older mines, such as those at Castlegate and Clear Creek, which have been operating for more than thirty years, have reserves before them sufficient to exceed their past output, and the possibilities of certain undeveloped areas, such as Huntington canyon, are barely suggested by the present output of the field.

The workable coal beds of the Wasatch plateau occur in the Mesaverde formation, which is from 1,300 to 2,000 feet thick and which consists of sandstone, shale, and coal. The lower part of the Mesaverde contains no coal, and the examination made last summer showed that it is singularly free from carbonaceous matter of any kind. Its base is marked by a massive, resistant sandstone, 50 to 100 feet thick, which middle member, 600 to 900 feet thick, containing the workable coal bed either rests directly upon this sandstone or lies in roughly equal proportions. Its lower limit is normally marked by a white sandstone, from 5 to 60 feet thick, an unusually clear and persistent "key" bed, which can be as easily traced as the basal sandstone wherever it is exposed.

The lowest coal bed either rests directly upon this sandstone or lies a few feet above it. The overlying sandstone and shale contain a large number of coal beds, some of which maintain workable thickness over considerable areas and at least one of which is commercially valuable nearly everywhere in the field.

Directly above the middle lies the thick cliff-making sandstone that forms the Castle Gate in Price River canyon, an object whose scenic attraction has long been appreciated by tourists.

Structural Features of the Field.

Throughout most of the field the beds lie very nearly horizontal or dip at low angles. In its northern part, between Castlegate and the north fork of Gordon creek, they dip to the northeast at low angles; to the west, in Pleasant valley, they dip to the north and northwest; in Bob Wright canyon, 15 miles due west of Price, they are nearly horizontal; to the south, in the east escarpment, between Star Point, in T. 15 S., R. 8 E., and the mouth of Huntington canyon, in T. 16 S., R. 8 E., they dip southwestward at very low angles, and in Huntington canyon they dip southward at an angle somewhat less than the gradient of Huntington creek. In short, the northern part of the Wasatch plateau coal field is structurally a broad, low half-dome, with its center in the northern part of Bob Wright canyon.

The rocks in certain parts of the field are much faulted, and at some localities the faults affect seriously the disposition and mining of the coal beds. All the larger faults were located and measured, and it is believed also that practically all the many determinable smaller faults are known. They are all of the normal type—that is, they are breaks in the strata caused by tension or stretching, as opposed to thrusting or compression—and they involve the simple dropping of the beds on one side of the break with reference to those on the other.

In the drainage basin of the north fork of Gordon creek the faults are somewhat complex. One large fault, which is just east of Coal canyon, in secs. 16 and 21, T. 13 S., R. 8 E., and which trends very nearly due north, brings the coal down from its high elevation in the ridge east of Coal canyon to an easily attainable height in the north fork of Gordon creek. Numerous smaller faults, which trend in diverse directions, cluster about the major fault, so that very detailed geological study of the central and western parts of T. 13 S., R. 8 E., should be made before actual mining is started. A few faults occur in the drainage basin of the south fork of Gordon creek, and some have caused displacements of as much as 100 feet or more.

In the long strip of territory between Pleasant valley and the mouth of Huntington canyon there are at least three faults that have a displacement of more than 1,000 feet, as well as a host of smaller ones. Pleasant valley lies along the most notable northward-trending fault, by which the beds on the east have dropped at least 1,000 feet, until the lowest coal bed is only a few feet above creek level on the east side of the valley, at the town of Clear Creek, whereas on the west side it is high up in the hills. A faulted zone accompanies the major fault throughout the strip mentioned, and the adjacent region parallel to it is broken by smaller faults that have the same general direction. Near the mouth of Huntington canyon is a zone in which minor faults are numerous. These faults, as well as all the major faults in the field, trend very nearly northward.

The faults affect mining operations considerably, for they break the continuity of the beds, and thus they either make necessary expensive slopes or shafts to reach the coal beyond or they make it economically impossible to continue the mine beyond the fault. They are thus of particular consequence in

undeveloped areas, and they have therefore received special consideration by the geologists in the work of providing adequate data for the distribution of the land into leasing units.

Coal is of Excellent Quality.

The coal of this region is of excellent quality and is highly esteemed by the users of western fuels. It is hard, black and lustrous, withstands weathering and transportation well, and is otherwise physically well adapted to meet the needs of the trade. It has a high calorific value, a moderate percentage of ash, and a very low percentage of sulphur. The results of many analyses made by the United States Bureau of Mines show that it maintains its high quality throughout the large areas. Most of it is a highly satisfactory domestic fuel, largely because of its cleanness and permanence in lump form, and small mines have for many years supplied it to consumers throughout the field. Many of the large mines now in operation were begun at the sites of old "wagon" mines.

The number of beds more than 5 feet thick ranges from one to four in different parts of the field. Localities in which there is not at least one bed 5 feet or more thick are exceedingly rare. At many places the total number of beds is large; a complete section of the coal-bearing member in Corner canyon, in sec. 12, T. 15 S., R. 7 E., shows twenty coal beds, but only five of them are over 2 feet thick, and only three are 5 feet or more thick.

The maximum thickness attained by any known bed in this field is 30 feet. This huge bed lies at the base of the coal measures in Pleasant valley, in the immediate vicinity of Scofield, where it is mined by the Union Pacific Coal Co. The lower bed is 28 feet thick at places in the Mohrland mine of the United States Fuel Co., and thicknesses in excess of 20 feet are common in the vicinity of Hiawatha and Mohrland. Ordinarily, however, the workable beds range between 6 and 12 feet in thickness.

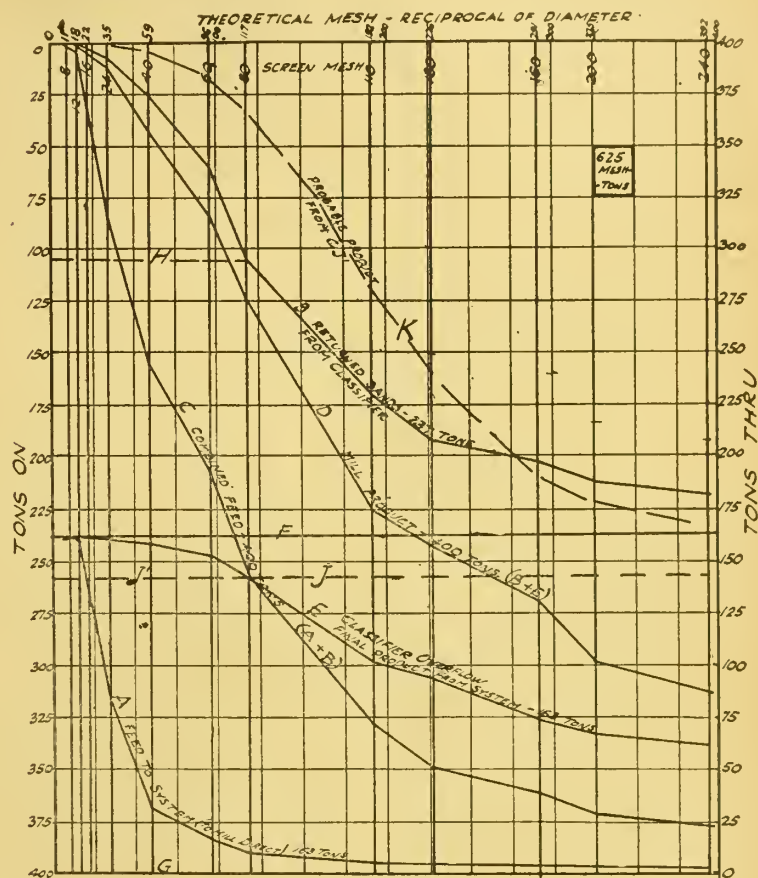
The investigations have yielded a large amount of information as to the number, extent, and thickness of the workable beds of coal; their location with reference to surface features; their accessibility for mining, and the quantity and character of the available water, timber, and other supplies needed in the coal-mining industry. One of the most valuable results of the work is the topographic map by which the region may be studied and mining operations may be planned with a degree of accuracy not otherwise possible. The publication of all this material and the map will afford the public a larger amount of needful information concerning the field than has hitherto been available.

SUGAR CONSUMPTION PER CAPITA

Sugar consumption in the United States in 1921 amounted to ninety pounds per capita, or an increase of nearly three pounds compared with 1920, according to compilations made by Facts About Sugar. It was sixteen pounds greater than in 1918, which year marked the low point of the war period. The total quantity of sugar marketed last year was 9,631,000,000 pounds, or 4,815,500 tons, of which a little less than 60 per cent consisted of sugar grown in the United States, and slightly over 40 per cent was of foreign production. The latter came almost entirely from Cuba and Santo Domingo. The full amount of sugar imported during the year was 2,812,560 tons, of which Cuba supplied 2,590,000 tons and other foreign countries 222,000 tons. Exports of refined sugar during the year amounted to 466,897 tons. Of the home-grown sugar consumed last year 1,150,000 tons was supplied by the beet sugar industry, 250,000 tons by Louisiana, 432,000 by Porto Rico and the Virgin Islands, and 165,000 tons by the Philippines.

ORE-CRUSHING EFFICIENCY—A CORRECTION

Through the unaccountable omission of the "key" explanation of the diagrammatic drawing that accompanied Mr. O. A. Gates' article on "Ore-Crushing Efficiency" in the January 30th issue of the Mining Review, much of the technical value of the article was lost. So that engineers and ore-milling experts may get the full benefit of the author's effort to help in the solution of crushing problems the drawing is reproduced herewith, with the "key" notes attached, as follows:



CRUSHING-CLASSIFYING SYSTEM WITH CIRCULATING FEED

- Area A.G.—Surface in original feed. (Done by mining, crushers, etc.)
 Area B.F.—Surface in sands by classified (circulating.)
 Area C.G.—Surface in combined feed: A. G and B-F (by totaling ordinates.)
 Area C.D.—Surface produced by mill, on combined feed.
 Area A.-E.—Surface produced by mill, on original feed: C-D. Assuming 80-mesh fine enough for the process, then
 Area F-B-H.—Surface in classifier sands uselessly returned to system.
 Area J'-C.—Surface in mill feed, all plus 80-mesh.
 Area J'-J-K.—Surface in probable product, from C-J' feed: 235 tons finished.

STRUCTURAL STEEL IN 1921.

The volume of structural steel orders placed last year amounted to 758,300 tons, according to compilations made by the secretary of the Bridge Builders and Structural Society, or 35 per cent of the country's capacity. It was the lowest of any year since 1912, when figures were first compiled, and was less than half the 1912 total of 1,750,000 tons. The following table shows the total of orders placed in each year since 1912. Figures for the war years are believed to be somewhat low, owing to lack of data on government work.

Tons		Tons	
1921	758,300	1916	1,482,000
1920	1,161,000	1915	1,495,000
1919	1,154,000	1914	1,080,000
1918	1,201,000	1913	1,300,000
1917	1,285,000	1912	1,750,000

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*Illustrated.

CRIMINAL ELEMENT CONTEMPTUOUS

Nothing which has happened in this city for many a long day has had such a profoundly depressing effect on the minds of law-abiding people as the cold-blooded murder of Charles A. Faus, the well-known and highly respected wholesale druggist, at his home on the evening of the 3rd instant. While seated at the dinner table with his wife and family, masked bandits entered his home, proceeded to the dining room and as Mr. Faus arose to inquire what they wanted he was shot down, and three days later died from his wounds. The invading thugs made their escape without attempting burglary and, as this is written, they have, apparently, been apprehended.

Murders are becoming alarmingly more frequent in this city. Hold-ups and burglaries are becoming so numerous that they have grown commonplace. The very atmosphere seems to be laden with an undercurrent of lawlessness that permeates every stratum of the social fabric. Police and detective agencies are working unceasingly to stem the tide, but the crime-wave sweeps on almost without interruption.

The criminal element seems to have no fear of consequences, for it is becoming bolder all the time. Is it possible that this boldness and utter disregard of consequences

on the part of lawbreakers is unwittingly strengthened through laxity in law enforcement? Let us hope not.

But the sentiment is being frequently expressed that our system of dealing with criminals is altogether too considerate of the feelings of the wrong-doer. The officers whose duty it is to apprehend law-breakers and develop evidence that will convict them, too often, it is claimed, find that their work has not been fruitful of lasting results; that wrong-doers are brought to the bar of justice and that, even after conviction and punishment has been meted out to them, they are rarely required to pay the full penalty that has been imposed, or that which their offense justifies. The officers arrest a man, the court convicts and sentences him and then the guilty one languishes in the penitentiary, not for the length of time prescribed or suggested by the trial judge and jury, but during the pleasure of the state board of pardons, which may mitigate or even terminate the sentence which has been imposed.

This system of handling law-breakers, it is claimed by many, has a tendency to create a feeling of contempt for the law, not only in the minds of those who have broken the laws and who have been convicted; but, it is claimed by students of psychology, and particularly by trained detectives and police officers who make a study of criminology, that men without criminal records get the impression that they, too, can enter the ranks of the housebreaker and holdup, or even the life-taker, without extra hazard in facing the law.

Men who think and talk along these lines believe that our state board of pardons ought to be abolished; and they also believe and state that once a man is sent to prison for a crime he should not be the recipient of flowers and food and favors from friends outside of the prison walls, and that he should not be regaled with concerts and entertainments by misguided souls who feel that he should be molded over again and be quickly released, so that he may feel that he had "a good time" while in prison—and that he would just as soon go back there as not.

Next Saturday the board of pardons will meet to determine whether the applications of more than twenty inmates of the state prison shall receive clemency—whether the judgments of courts of justice shall be set aside or modified. What's the use of having courts and paying the costs of their maintenance if their actions in dealing out justice to offenders can be nullified by a pardoning board? Let's have an operation performed for the elimination of this verminiform appendix—the state board of pardons.

BANKS COULD STARVE "BUCKETSHOPS"

Several additional failures of "bucketshops" and worthless promotion houses have occurred this week. And the end is not yet, says the New York Curb.

There is no reason why a stock brokerage house honestly and properly conducted should fail. This kind of business is as safe and sound as any business can be. The function of the broker is to buy or sell for cash or on margin such securities as are ordered by the customer. The broker runs little or no risk. His commission is established by exchange rules.

If the bankers refused to have any dealings with brokerage concerns of questionable character they could instantly make it difficult, if not impossible, for such crooked concerns to flourish.

Some "bucketshop" men, branded as such by stock exchanges, have had their accounts with banks of the highest respectability.

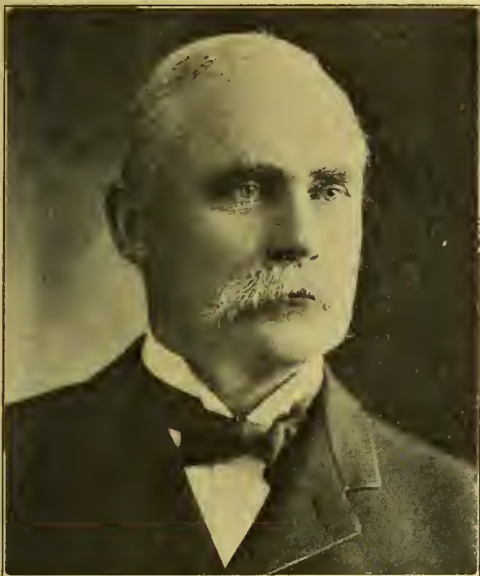
It is high time that the bankers and banking institutions cut off all sustenance from these thieving concerns.

PROMINENT ENGINEER CALLED BY DEATH.

Hubbard W. Reed, prominent and most well and favorably known for many years in western mining and industrial circles, died at the home of his daughter, Mrs. Robert J. Glendinning, on January 30th, following a sudden illness, at the age of 72 years, having been born in New York City, December 31, 1849.

Hubbard W. Reed was the original owner of the famous Camp Bird mine, at Ouray, Colorado. While that property was still a prospect he sold out to Thomas J. Walsh for \$30,000. The latter made a huge fortune when the property was finally sold to the Camp Bird (English) Syndicate for \$6,000,000.

Soon after his graduation from Dartmouth college Mr. Reed entered upon his engineering career and followed his profession for a number of years in the Dakotas. He was one of the engineers in charge of construction of the



Hubbard W. Reed

Northern Pacific railroad. Following that he went into Mexico and later returned to settle in Colorado. For thirty years he was manager of the Revenue Tunnel property, and it was while thus engaged that he became the owner of the Camp Bird property.

In the early nineties Mr. Reed came to Utah, where he again took up mining. He was one of the promoters of the Daly West Mining Company. He became heavily interested in the mines of Mercur, Tintic and other camps and was uniformly successful.

About two years ago he became identified with the Utah Fire Clay Manufacturing Company, and at the time of his death he was vice-president and general manager of that company, and he was largely instrumental in building up the business of that company to the enviable position it now holds in the field of western manufacturing enterprise. A multitude of friends and business associates mourn his untimely and sudden demise.

OPENING UP THE ELY-CALUMET

Reno, Nev., Feb. 11.—Al. D. Meyers, often termed "the father of Goldfield" and who acquired a wide reputation at that time, is opening up the Ely-Calumet Copper Co. property at Ely. Mr. Meyers was in Reno recently and stated that by three tunnels he has opened the Ely-Calumet to an

extent that it now shows about 70,000 tons in sight. The two tunnels open the ore body while the third will be used as an adit through which the ore will be extracted. There are two large veins on the property. One carries lead and silver in proportions of about 25 per cent lead and 20 ozs. silver while the other carries about 30 per cent zinc oxide. The two veins are close to each other but as Mr. Meyers says "zinc, like a wild animal, likes to live by itself, as one may see by an examination where the zinc has left the silver-lead content and gone over by itself to another hiding place." He also states that the zinc will undoubtedly later, at depth, turn to lead-silver.

He has entered into arrangement with the Utah Zinc Company to handle the product of the mine after April 1st. With the high content of zinc, ore can be shipped at a good profit.

About 2000 feet of work has been done in opening up the property. The crosscut tunnel, now within about 20 feet of the point where it is expected to tap the first vein, will have a depth of about 265 feet from the face to the surface.

TO BUILD 35-MILE PHONE LINE.

The Leadville Mines Company, located 35 miles from Gerlack, Nevada, on the Western Pacific, will build a telephone line from the mine to Gerlack. While at the mine last week, General Manager A. A. Codd let a contract for 1000 60-foot poles for the line. Mine operations have long been retarded for lack of quick communication between the mine and Gerlack the point of receipt of supplies and shipment of concentrates. The new line may also be used by ranchers and others along its right of way, that section of the country having been long shut off from rapid communication with the outside world.

The sinking of the shaft at the Leadville is making good progress. At latest report it was 60 feet below the 300-foot level. It is proposed to sink to the 500-foot level, but a station will be cut at the 400 and a drift run in under the ore body on the 300-foot level.

When the mill shut down, owing to the extreme cold weather, there was a considerable amount of ore broken down, enough, it is said, to run the mill 60 days. During the week of the shut down a new ore-body was entered that carried about 60 ounces in silver. This, with the lead content, brought the mill head to about \$60 a ton as against a former value of \$35 of gold, silver and lead content.

The management announces that when the mill starts again on March 15th, an ore reserve of about 1000 tons will be in sight. An ore pocket will be cut when the 400-foot level is reached and another drift will be run under the one from the 300 and by raises to the 300, all ore will thereafter be taken out through the 400-foot level. The plan is to keep one shift at breaking ore and one shift in sinking the shaft.

During the shut-down of the mill several changes are being made with the purpose of increasing the mill capacity from about 30 tons daily to between 40 and 50 tons. The two trucks owned by the Leadville have just completed hauling in one carload of coal and one of oil and taking out a shipment of 25 tons of concentrates that have been shipped to a Utah smelter. It is expected that this shipment of concentrates will run considerable higher than heretofore as the last two weeks' mill run carried a large percentage of the \$60 ore.

Is Germany really poor or merely poor pay?—Norfolk Virginian-Pilot.

Around the State

Vernon S. Rood of the Utah Apex mine is in the East and it is understood that a conference is being held which may result in that mine resuming operations. As a matter of fact, it is said that a few men have already gone to work at the mine.

To facilitate the handling of the waste and other transportation in and out of the long tunnel used by the Park Utah, the management has decided to electrify the Ontario drain tunnel, and within the next two weeks the heavy rails and wire will be on the ground and work commenced.

George Paxman, Jr., and Mart Steele, Silver City miners, are shipping regularly from a new strike on the Golden Treasure claim of the Tintic Drain Tunnel Company. Already they have shipped four or five carloads of ore and the product which they are now mining carries around thirty ounces silver.

According to the daily press, Silver Shield, which is divorcing itself from Bingham Galena by declaring a dividend of the Bingham Galena stock received for the company's property at Bingham, has benefitted by the action. The company is said to be negotiating for some Park City property so that it can again become an operating company.

Judgment of \$205,069.96 is granted the Utah Copper Company in a decision rendered a few days ago in the United States district court in the case against Salt Lake county for a refund of taxes paid by the copper company under protest for the years 1917 and 1918. The taxes were collected on tailings dumped by the company near the smelter at Garfield.

Out at the Water Lily workings of the Chief Consolidated Company one of the drifts was driven a distance of 378 feet during the month of January during which time there were some brief delays on account of mechanical troubles. The total footage for the month at this place, where the drifting is being handled under the direction of the Walter Fitch, Jr., Contracting Company, was 686 feet.

Well authenticated rumors are in circulation that with the opening up of greater ore bodies in the Park Utah, which is a certainty, and the consequent activity and development resulting in the entire eastern section of this district, the Denver & Rio Grande railroad will reduce the grade of their road between Park City and Salt Lake to not more than two per cent, in order that one engine will be able to haul freight trains and take care of a greater tonnage of ore than at present. —Park Record.

The Spring Canyon Mine Rescue association prevented a great fire in the mine of the Carbon Fuel Company, according to C. A. Allen, mine inspector for the government, who returned from a visit to Spring Canyon on the 3rd. A blaze started from a "gas" feeder and the prompt work of the rescue station crew kept the fire confined, and after twenty-four hours' work succeeded in quenching the blaze. Several of the men had narrow escapes from death in fighting the fire, said Mr. Allen.

At the recent annual meeting of the members of the Salt Lake Stock & Mining Exchange the following were elected as a board of governors for the ensuing year: George Baglin, Fred C. Dern, B. W. Dixon, E. A. Hartenstein, H. W. Lane, Irving D. Lowe, J. C. Lynch, W. D. Nebeker and Fred R. Wooley. In the organization of the new board H. W. Lane was made president; B. W. Dixon, first vice-president; F. R. Wooley, second vice-president; Irving D. Lowe, third vice-

president; H. V. Altree, secretary, and G. P. Norton, treasurer.

Progress of installing electrical equipment in the Grand Central mine at Mammoth is steady. The power line from the Chief Consolidated mine at Eureka has been strung almost to the Grand Central mine. Transportation towers are being constructed. As soon as these are completed the transformers will be placed in position and connected. The machinery, now being driven by steam, will be operated electrically. The Chief Consolidated Mining Company, which now controls this property, has equipped all of its properties with electrical machinery.

A carload of silver ore, expected to carry around 500 ounces to the ton, is now at the Utah Ore Sampling Company's mill at Silver City. This ore, which was mined from one of the blocks of ground at the Iron Blossom, follows closely a shipment which was worth \$35,000. The miners who are interested in the lease from which this high-grade ore is coming are William Jones, Leland Tuft, Perry B. Fuller and J. B. Sylvester. The ore which they have just sent out, while not as rich as the shipment settled for in January, will net the lessees a nice sum of money, as the company's maximum royalty is 50 per cent.

The Nelson Queen, located in "Peaceful Valley" in the eastern section of this district, says the Park Record, is attracting attention, and from those who have visited the property recently comes the report that new ore showings have been uncovered with increasing values, and another shipper is looked for. The Nelson Queen is owned by the Nelson Brothers, and is located in the section that is attracting much attention these days, and which promises to be the talk of the mining world before the end of the year. Manager Jinks Nelson is very optimistic as to the future of his property, and has substantial reasons for so being.

NEW BOOKS RECEIVED

MINERAL LAND SURVEYING, Third Edition, revised and enlarged, by James Underhill, Ph. D., Mining Engineer, U. S. Deputy Mineral Surveyor for Colorado; 237 pages, 4 1/4 x 7 inches. John Wiley & Sons, Inc., 432 Fourth Ave., New York. Just issued. For sale by the Salt Lake Mining Review, price \$3.50.

This book treats on the surveying and patenting of mineral lands and is designed for the use of mineral surveyors and students of mining engineering. This work describes the methods used at the present time in the surveying of mineral lands in the western portion of the United States. In this edition several additions have been made, especially in treatment of the direct solar observation. The specimen field notes to illustrate the requirements of the office of the U. S. Surveyor General for Colorado have been entirely rewritten, a different group of claims being used, which represent the practice at the present time. The subjects treated, according to table of contents, include: Direct Solar Observation; Solar Attachments; Traversing; Lode, Millsite and Placer Location; Surveying for Patent; Field Notes and Forms; Office of United States Surveyor General; Examination for Commission as United States Mineral Surveyor, and an appendix covering Manual of Instruction for the Survey of the Mineral Lands of the United States. This third edition of the work is just off the press.

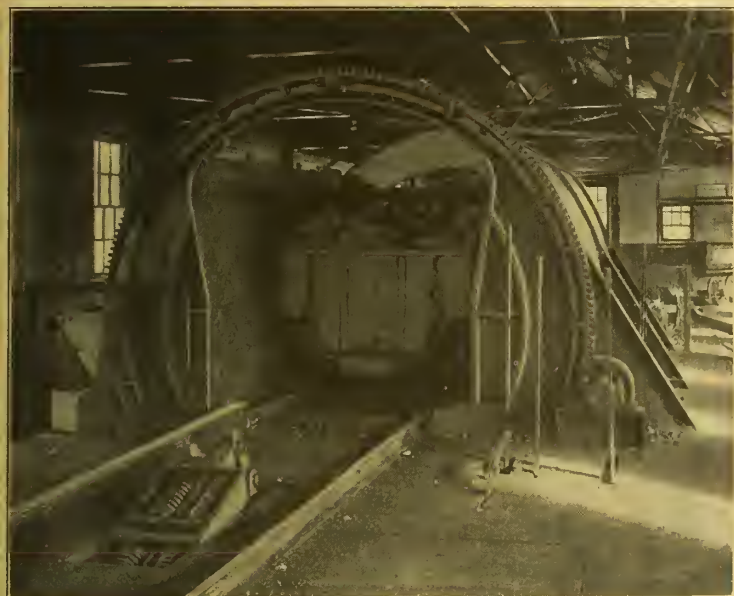
The steel industry on January 21 asked the Interstate Commerce Commission to remove entirely the 40 per cent increase in freight rates granted throughout eastern territory in August, 1920.

Black Hawk Coal Mine at Hiawatha

The first impression a visitor to the Black Hawk coal mine receives is calculated to upset any preconceived ideas of mining as a dangerous occupation, and the farther one goes into the workings, the deeper grows the conviction that, in this mine at least, forethought, care and modern appliances have reduced the dangers to a minimum. Every step in the development of the mine has been taken with the welfare and comfort of the worker uppermost in the minds of the management.

The Black Hawk mine is located in the little town of Hiawatha, Utah. Originally opened by Ogden operators in 1910, it was acquired two years later by the United States Fuel Company, owners and operators of the King, Hiawatha, and Panther mines, all of which have made notable progress under the able management of the company's General Superintendent, Mr. R. M. McGraw.

Upon assuming charge of the Black Hawk, an extensive program of improvements and development was initiated and, under Mr. McGraw's supervision, the mine has been placed on a par with the other mines of the company, which rank among the best in the country.



Rotary Dump in Black Hawk Tipple

The coal mined is high grade bituminous. It lies in two well-defined seams which vary in thickness from five to thirty-one feet.

Mining Methods and Equipment

The main entries, approximately ten feet wide and ten feet high, are electrically lighted, and the walls whitewashed, thus facilitating and furnishing added safety for the passage of the coal trains; the walls of the man-way, which is of adequate dimensions, are also whitewashed.

The room and pillar method of mining is used, the rooms being 20 feet wide and from 14 to 25 feet high, and the pillars 52 feet wide. The roof of the workings are devised in a manner that renders timbering unnecessary except in a very few instances.

The coal is loaded out by the miners into cars holding approximately four tons each, seventeen of which constitute a "trip." These are driven by electric locomotives to a tram 5,600 feet in length, having a maximum grade of 20 degrees, down which the cars are gravitated. At the bottom they are run over a trestle leading to the upper part of the

tippie, which is one of the most complete in existence, having been built in 1915 at a cost of approximately \$165,000.

No expense was spared in equipping it with the most modern devices for dumping and sorting the coal. The cars are uncoupled singly from the "trip," and each separate loaded car run, by gravity, down under the rotary dump, which is approximately 9½ feet in diameter. As the car approaches the dump it strikes a tripper to automatically release the dogs which clamp the four wheels of the car to the track in the dump. As the loaded car enters the dump, it strikes the car just emptied, drives it out and up a short inclined track on the opposite side, whence it is carried back to gravity to a return track and coupled on to the trip of empty cars. The rotary dump with the loaded car, upon the release of a lever by the operator, turns a complete revolution, dumping the coal down on to the sorting screens. The coal is sorted into four sizes—slack, pea, nut, and lump coal—which pass on down through the hoppers for loading into freight cars, one car being spotted under each hopper.

A most effective safety switch has been installed by Mr. McGraw at the top of the tram just outside the entry, which makes it impossible for a "trip" to get away and run wild down the tram before the cable is attached. The necessity for such a device is apparent from the fact that in normal times about 2,250 tons of coal per day are loaded out of the mine and taken down the tram to the tippie.

Protective Methods of Shot Firing, Etc.

The coal is all shot with permissible powder and electric detonators. Each miner loads and connects his holes at the end of the shift, having received his powder at the distributing magazine before going on shift, the detonators being brought around by the shot-firer just before loading time. After preparing and connecting up the round, the miner, upon leaving throws in the room switch, which is enclosed in a safety firing box located at the entry to the room. The firing box is so constructed that the door cannot be closed while the switch is in. When the miner comes back on shift he pulls the switch, closes and locks the door to the firing box and thus makes it impossible for the switch to be thrown in until the box is unlocked again at the end of the shift.

As an extra protective measure, district switches are installed at each entry, the keys to which are in charge of the shot-firers. After all the men are out of the mine, the shot-firers inspect all connections, and, upon coming out, unlock and throw in the district switches. After making sure that all men are accounted for as being out of the mine, the shot is pulled at the large control switch enclosed in the safety firing box in the check house. By this method there are three safety firing boxes protecting miners at work—namely, the room off the entries, district switches and control switches.

The ventilation of the mine has been given careful thought and a large blower which delivers 120,000 cubic feet of air per minute is kept constantly in operation while the men are working.

The installation of the various labor saving and safety devices throughout the property has resulted not only in the added welfare of employees and reduction of accidents, but has very materially aided the company through the greater efficiency of the workers.

Associated with Mr. McGraw in the successful operation of the mine are Mr. C. N. Orr, Mine Superintendent; Mr. John Taylor, Mine Foreman; J. L. Forrster, Engineer, and Messrs. E. E. Jones and A. W. Dennison, Mine Inspectors.—From the January issue of *The Detonator*, published by the California Cap Co., at Oakland, California.

Personal Mention

L. D. Yundt has moved from Bayhorse, Idaho, to Salt Lake City, Utah.

Philip Wiseman has been re-elected vice-president of the Los Angeles Chamber of Mines.

The officers of the Alta Tunnel & Transportation Company moved headquarters to 133 Regent St. early in the month.

William T. MacDonald, of Salt Lake City, has become mill superintendent for the Moctezuma Copper Company, at Nacozari, Sonora.

Walter J. Akert, well known local assayer and chemist, has accepted a position as chemist with the Chino Consolidated Copper Company, at Hurley, N. M.

Charles A. Smith, superintendent of mines of the Ray Consolidated Copper Company at Ray, spent the holiday season at Salt Lake City, returning to Ray early in January.

Martin Trehwella, superintendent of the Agnew mine, a property of the International Harvester Co., near Hibbing, Minn., has resigned his position and will move to Los Angeles, California.

Alex. Colbath, general manager of the Silver Reef Consolidated, is in the city for a short time. He states that the company expects to cut loose on broad and aggressive lines this spring.

Wm. Claussen, sales manager for the Pacific Coast Coal Co., with headquarters at Seattle, Wash., was in Salt Lake familiarizing himself with Utah coal mine conditions early in the month.

Bernard H. Grant, a well known local mining engineer is now associated with Landes & Company, machinery dealers of 246-48 West South Temple St., Salt Lake City, in a sales and consulting capacity.

H. F. Crittenden, who left here two or three months ago, to become associate editor on the Tonopah Mining Reporter, recently severed connection with that publication to become associate editor of the Elko Free Press.

W. Earl Greenough, mining engineer of Wallace, Idaho, and Spokane, has returned from the oil fields of Wyoming, where he had been for several months giving his attention to the development of a large oil tract near Lander.

R. H. Channing, general manager of the Utah Consolidated, at Bingham, and the Vipont Silver mines, in north-eastern Utah, has just returned from the east where, he states, the general situation looks none too bright.

Four Tintic mining men, Leo Acheson, Robert L. Willis, Lee Johnston and Bryon H. Egan, plan to leave during the next thirty days to take positions with the Braden Copper Company operating at Rancagua, Chile, about 125 miles from Valparaiso.

Lewis G. Gillett, mining engineer and superintendent of the Virginia Louise Mining Company, of Pioche, plans to leave shortly for Hostotipaquillo, State of Jalisco, Mexico, on mine examination business. The contemplated trip will be of three months duration.

Charles Lee Horsey, well known lawyer and mining man who claimed Pioche as his home for many years, but who moved to Los Angeles a year or so ago, has again succumbed

to the lure of Nevada and has moved to Las Vegas, where he will be in closer touch with his Nevada interests.

Dean E. Winchester, author of the first government bulletin on oil shale, and who is now a resident of Denver, has recently returned from a professional trip to Brazil. Mr. Winchester has not been connected with the government service for several years, being engaged in private practice on geological work.

Petroleum Notes

It is estimated that \$20,000,000 will be spent in pipe line construction in the Rocky Mountain states in 1922.

H. E. Hamilton, formerly with the Midwest Refining Co., has taken a position with the Oil Well Supply Co. organization at Casper, Wyoming.

Deep test wells on the Mid-Northern and Frantz corporation's holdings in the Cat Creek, Mont., field have been projected for the coming spring. Efforts to determine whether there is another producing sand in the field will be made, it is stated.

Installation of a third pumping unit on the Lost Soldier-Fort Steele pipeline of the Illinois Pipeline Company is being made to facilitate the movement of crude to the railroad. Two pumping units have been installed since last summer, says a Casper, Wyoming item.

A recent Denver dispatch states that the Ohio Oil Company has just completed a deal whereby it acquires 1,600 acres of the Rock M. Pope permit on the Duchesne structure in Duchesne county, Utah. The Pope permit embraces a little less than four sections of land and lies immediately west of the Clyde Early claim on which the Utah Southern Company is putting down a test well.

Carter Oil Company, one of the Standard Oil subsidiaries operating in Utah, has abandoned its test hole in the San Rafael swell as a dry hole at a depth of 3035 feet according to reports from Price. The test was drilled in similar formation to that of the Circle Cliffs structure where the Ohio Oil Company some weeks ago abandoned its test as a dry hole at approximately 3,115 feet. Although less in depth the Carter test is said to have tested the formation about 400 feet greater in geological depth than did the Circle Cliffs test. The formation is reported to have been very similar in both wells, water bearing sands having been found in the Carter test at approximately the same relative depth as they were found in the Circle Cliffs test.

Christian Vrang, consulting geologist, has gone to New York to confer with a group of financial men relative to the future development of certain oil lands in Utah and Wyoming. He stated that acreage in the Uinta basin and Wyoming lands near Mountain View and Big Piney, Wyo., are contemplated to be developed this spring and summer. One of his new structures is said to be the Jephlyra anticline, located by him in Uintah county, Wyoming, in the Bridger basin. This anticline trends east and west, paralleling the Uinta mountains, and has recently been verified by Fisher & Lowrie, consulting geologists of Denver. Mr.

rang will attend the American institute of mining engineers' proceedings in New York during the last two weeks of February.

In his first annual report made to Congress, Secretary of the Interior Department states that his department estimates that there are 1,325,000,000 barrels of underground oil still to be extracted from the public domain, but that there are 50,000,000,000 barrels of oil recoverable from the shale deposits. On the basis of royalties, he estimates that if the government received 10 cents per barrel royalty on these immense deposits that the sum of \$5,000,000,000 could eventually accrue to the public treasury, and that the total value of all this oil in added wealth to the United States would be \$100,000,000,000.—The Shale Review.

Construction Notes

Plans for the new high school building at Manti, Utah, have been revised to call for an auditorium.

The city of Price, Utah, has purchased a reservoir site on the Helper hill, on which will be constructed an auxiliary reservoir 200 by 225 feet.

It is currently reported that the big steel-coal combination, formation of which is being worked out by L. S. Mines, will be "throwing dirt" at the selected site of one of its plants, within the next thirty days.

Postmaster Leo M. Rusk of Pocatello, Idaho, has received word that the plans for a \$40,000 addition to the federal building and postoffice at Pocatello are being drawn by architects in the postmaster general's office.

The board of education of Juab county are preparing to advertise for bids for the construction of a new school building for the Juab district, at Nephi, Utah. Bonds to the amount of \$175,000 are to be sold for the purpose.

The government has completed the purchase of 200 acres of land four miles from Livermore, near San Francisco, and will construct on this property a \$2,000,000 hospital for the treatment of tubercular ex-service men, Major Louis T. Grant, director of the United State veterans' bureau in San Francisco, announced a few days ago.

Frank T. Torpey, president the Uncle Sam Mining Company at Eureka, Nev., announces that most of the machinery for the Uncle Sam's new mill has been assembled and that the erection of the new mill will begin just as soon as weather permits. This is the third company that contemplates the erection of its own reduction works at Eureka, Nevada. The Holly and the Croesus are also making such plans.

The Arizona Standard Copper Company, of Parker, is installing a considerable amount of new machinery on their property south of Parker, and are planning the construction of a number of concrete camp buildings. It is expected that the first unit of the mill, now under construction, will be completed soon, and the property put on producing basis.

At a special meeting held on the 6th instant the Salt Lake board of education officially decided upon the erection of a 24 room fireproof building to replace the Lafayette school, which was destroyed by fire January 20. The new

building will cost approximately \$187,000 and will be of concrete and brick construction, including two floors and a basement. It is hoped by board members that work on the new building may be commenced by April 1.

E. D. Smiley obtained a lease on the old Yuba Mill site recently from the Amalgamated Pioche Mines & Smelter Corporation and also the use for a period of time the surplus water from the company pipe line. Mr. Smiley, who is a veteran mill operator, plans to erect a combination cyanide and concentration plant for the treatment of lead-silver oxidized ores of which a large tonnage exists in the Yuba and Meadow Valley mine workings adjacent to the site of the contemplated plant.—Pioche Record.

Immediate construction of the Riverdale viaduct was assured when the Weber county, Utah, commission voted last week to advance \$10,000 to the state road commission for the preliminary work in digging test pits for the foundation and abutments for steel work. Estimated cost of the viaduct is \$240,000. It will cross the Weber river and the Union Pacific tracks. Construction expense will be shared by the railroad and government paying \$100,000 each and Weber county advancing the additional \$40,000.

Trade Notes

Landes & Company, the well known machinery dealers of Salt Lake City recently took over the Salt Lake account of the American Manganese Steel Co., of Chicago.

The local offices of the Ingersoll-Rand Company have been moved from the Dooly block to the ground floor of the Vermont building, on South Temple street.

The Belcher & Shaw Co., Dooly Bldg., Salt Lake, recently sold a Stratton air separator to the Eureka-Croesus Mining Co., Eureka, Nevada, E. J. Harris, superintendent.

F. M. Rookie, sales engineer, became intermountain representative of the Pacific Tank & Pipe Co., of San Francisco, on the first of the month, with offices in the Kearns building, Salt Lake.

The Salt Lake Hardware Co. reports the recent sale of a large Star oil drilling rig to Mrs. Mary Connell who will soon begin active drilling operations in the Spring Valley section of Western Wyoming.

Two four-ton electric mine locomotives were sold during the past week by Westinghouse Electric Co. to the Park Utah Mining Company, which now is electrifying the Ontario drain tunnel for haulage purposes.

The Hercules Powder Co. announce a reduction of \$7.50 per 1,000 feet in the list price of Cordeau Bickford detonating fuse, effective February 1. This applies to the No. 6 plain, No. 6 countered, and No. 6 double countered grades. There is also a reduction in price of Cordeau crimpers and straight unions for connecting ordinary Cordeau Bickford.

Geo. E. H. Goodner, certified public accountant of Oklahoma, has resigned as consulting auditor in the natural resources division of the income tax division at Washington, and has become associated with J. C. Dick, formerly head of the natural resource division, and together as tax consultants, they will give special attention to the technical

questions involved in federal and state tax laws and to the preparation and presentation of federal tax matters before the treasury department at Washington. Offices are at 1502-3 Walker Bank Bldg., Salt Lake City.

The Pelton Water Wheel Co., of San Francisco and New York, has issued Bulletin No. 17 "Pelton Water Wheels (Impulse Turbines) and Reaction Turbines." The bulletin describes the various types of hydraulic equipment manufactured by the company, and discusses their application both to the generation of hydro-electric power and to the direct operation of many different kinds of machinery. Some space is also devoted to governors and to pressure regulating devices. The bulletin comprises 48 pages and is illustrated by a number of drawings and photographs. Copies may be obtained upon application to either office of the company.

The Denver Fire Clay Co. has just issued a most instructive and enlightening illustrated catalogue on oil fuel burners and furnaces. It is designated as Bulletin No. 301, and covers the subjects mentioned in a manner that can not fail to answer any question that might arise with respect to the nature and class of any grade of fuel oil that a user, or contemplated user of such fuel would be interested in. DFC oil burners are manufactured by the company in such variety, size and design that the requirements of any one, under any condition, can be supplied. How these burners function, how the various grades and classes of fuel oil are utilized by them to best advantage—whether in a small muffle furnace or a large steam boiler—is fully explained and illustrated in this catalogue. In addition to complete descriptions and illustration of the burners themselves, a large number of oil-burning furnaces manufactured by the company are also completely illustrated and described. Any one interested can secure a copy of this bulletin without cost by requesting a copy from either the Denver or Salt Lake offices of the company.

JAMES W. WADE GOES TO TINTIC STANDARD

Several weeks ago A. J. May, who has been superintendent at the Tintic Standard Company's mines for a year or more past, tendered his resignation to General Manager E. J. Raddatz, so that he could take hold of personal affairs that demanded his time and attention.

As successor to Mr. May, Manager Raddatz announces the appointment of James W. Wade, a Salt Lake mining engineer well known throughout the mining west and one who has a most comprehensive knowledge of the Tintic mining district. He was connected with the Mammoth Mining Company for about eight years and some years ago operated the well known Scranton mine of North Tintic. In addition to being a practical miner he is a mining engineer and in recent years has operated properties in Utah and Nevada.

As far as known there will be no other changes at the Tintic Standard. The two foremen are R. Z. Hodges and J. B. Haffner. The mine is now employing a force of about 250 men.

It is reported that Ontario's gold production for 1921 will be approximately \$3,870,000, and with the premium added \$15,200,000. Silver production in the Cobalt and surrounding districts will aggregate close to \$200,000,000 for the year 1921.

The world is becoming more efficient. In the old days before bootleggers, drinking one's self to death was a long and painful process.—Coatsville Record.

In Nearby States

ARIZONA

According to an announcement made January 27 by General Manager Grant H. Dowell, of the Copper Queen mine at Bisbee, that property will resume production of copper, in all likelihood, before March 1.

At Miami, the International smelter has blown in a second furnace and will no doubt double its output of 820 tons of copper per week which has been the production since the resumption in November. Over 300 men are now being employed at the smelter.

It is reported from Globe that the Bethlehem Steel Company has taken an option on 42 iron claims located on Canyon Creek, 60 miles north of that city, and that the price paid is \$150,000. Engineers for the company are said to have made an examination of the ground and to have recommended its acquisition by the eastern concern.

COLORADO

Work on the Roosevelt property has been resumed, after a layoff since the holidays. They have just opened up a fine streak of mineral on the Meteor, and will start their mill going during the present month, says the Idaho Springs Gazette.

It is reported from Empire that the Empress tunnel people have let a contract for 200-ton mill to be in operation within sixty days. They have quite a lot of ore broken and in sight and will have quite a reserve of ore when their mill is ready. It is understood that the mill will be a concrete-steel structure.

The old St. John property at Montezuma has been turned over to a new company incorporated as the St. John Mining Company. Mr. Al. Boyd is the manager and Lewis Wagner of Denver, the attorney of the company. Two shifts are now at work at the mine, and a new strike of silver-lead ore has been opened in the lower workings, but no information has been given out.

IDAHO

According to reports at hand heavier pumping machinery will be installed by the Carpie Mining Company, a Cabinet, and that a drift from the 300-foot level of the shaft will be driven within a short time. The Carpie is one of the best copper prospects in the Pend Oreille district.

High grade ore has been struck by the Hecla Mining Company, in its Wide West claims, according to reports at hand. The Wide West is part of the group of claims in the Tiger-Poorman group acquired by the Hecla from the Federal Mining and Smelting Company in the settlement of litigation in 1921.

The Western Union Mining Company, which is operating northwest of Wallace, shipped twenty-five carload of ore between November 19, 1920, and December 31, 1920, according to reports from Ben L. Collins, secretary-treasurer. The gross value of the ore was \$72,248 and the net smelter returns \$48,046.

The Lawrence mine, a silver-lead property, in Bonneville county, after being idle for more than a year, has been leased by Joe Reed, its former manager. He has a carload of concentrates containing 50 per cent in lead and value in silver which will be ready for shipment in a short time. The last car of ore shipped from this mine netted \$5,000.

The lower crosscut tunnel on the property owned by

the Jim Blaine Silver Syndicate in the Pine Creek district, has been advanced 275 feet, according to Manager Harry Correll. The face of the crosscut shows a heavy mineralization carrying some lead values in a promising formation. Machinery was recently installed and machine drills will be used.

NEVADA

Sam Casper and associates have received returns on a car of ore shipped from their mine about a mile north of Hanson's ranch, near Golconda, and report that they received a little over \$99 a ton, \$4.50 being in gold and the remainder in silver. Another shipment is being taken out.

A new wage scale effective January 16 was posted by the Nevada Consolidated at the mines and smelter. Under the new wage scale mechanics receive \$5 a day, miners, \$2.25 and common labor \$3.75. This is a reduction of 50 cents a day for mechanics and miners and an advance of 50 cents a day for common labor.

The Lucky Boy Mine situated near Fay, 25 miles east of Pioche, is now being worked on a small scale, according to Friel Lytle, one of the owners, who was in Pioche recently after powder and supplies. Last Spring, high grade old quartz was struck near the surface and attracted a number of mining men to the discovery, which apparently assesses great merit.

The lessees of the Ophir mine, at Virginia City, who recently made the rich strike in the old Ryan stope completed sacking up a shipment of four tons of ore a few days ago and the same went out by express to the Selby Smelting & Lead Co., of San Francisco. Sampling of this shipment showed the ore to average \$2,116.64 per ton, and the gross value is therefore better than \$8,000.

Plans for the further development of the Betty O'Neal silver mine in Lewis canyon, near Battle Mountain, and financing of the project, including the construction of the first 10-ton unit of a flotation mill, were arranged at recent meetings of the directors of the company in Boston, says Noble H. Getchell, manager of the property, who returned January 17 from a three weeks trip to New York and Boston. Mr. Getchell states that the company now has in the treasury more than enough money for completion of the project and that the utmost energies of the force will be applied to mine development and early construction of the mill.

UNCLE SAM TO SHIP AND MILL ORE.

Eureka, Nev., Feb. 11.—The freight rates and excessive smelter charges preclude the shipment from Eureka of any ore that does not run over \$40 a ton. During the past year some of the best metallurgical experts, including the staff of John Hays Hammond, have been carrying on experiments with Eureka ore with the view of finding the most economic method of handling it. It is announced that the problem has been solved. Engineer Rosenshine of the Eureka Uncle Sam will combine in the new mill, soon to be under construction, the best of the John Hays Hammond process with some of his own, as the Uncle Sam ore differs a little from that at the Holly and other mines in the district.

During the past ten days the development work at the Uncle Sam has been retarded on account of need of further ventilation in the drifts and stopes. A new Fairbanks-Morse engine arrived in Eureka a few days ago and will be

installed to operate a large blower and suction ventilator.

In the opinion of Engineer Rosenshine the Wade lode drift is now within 50 feet of a larger body of shipping ore than has as yet been opened in the mine. He also says that the main tunnel on the Hamburg lode is passing through an excellent ore line with evidences of opening into high grade. The face of this tunnel is now within 580 feet of the objective point in the newly acquired Hamburg claim. With work progressing at the rate of 10 feet a day it will require about 60 days to get into the old Hamburg workings where a large amount of ore was extracted during the early days of the mine.

It is planned to make a shipment of high-grade within this month. It will go to the smelter at Salt Lake City. This ore has been sorted from the several drifts, raises and from the tunnel workings. The lower grade is being saved as against the time of milling in the new mill next spring. It is anticipated that a large amount of good grade milling ore will be on the dumps long before the mill is ready as a considerable quantity is already in sight and mined. It is claimed that the new mill will handle at a profit all ores running over \$5.50 a ton. As the mining at the Uncle Sam is mostly by tunnel, the cost of extraction is low.

QUICKSILVER IN 1921

Preliminary figures showing the production of quicksilver in the United States in 1921, compiled by F. L. Ransome, of the United States Geological Survey, Department of the Interior, give a total of 6,339 flasks, as compared with 13,392 flasks in 1920. Of this output 3,094 flasks is credited to California, 3,144 to Texas, 100 to Nevada, and 1 to Idaho. So far as could be learned, Oregon produced no quicksilver in 1921.

In California 7 mines reported production, but the output from all but the El Senador mine, of the New Almaden group, was very small. The New Idria mine, for many years the largest producer of quicksilver in the United States, was idle in 1921. In Texas the Chisos was the only mine that remained continuously productive, but a small output was expected in December from the Mariscal mine, near McKinney Springs, and is included in the total. In Nevada about 100 flasks was obtained in the Pilot Mountains, east of Mina. The single flask reported from Idaho was retorted incidentally to development work in the Yellow Pine district, Valley County. During the year the United Mercury Mines Co. acquired over 100 claims that were formerly held by the Idaho Quicksilver Co., the Monumental Mercury Mines Co., and other companies in the Yellow Pine district.

In Oregon, the War Eagle Mining Co., operating what was formerly known as the Rainier mine, in Jackson County, completed a 25-ton Scott furnace in 1920 but is not known to have produced any quicksilver in 1921.

The average price of quicksilver in 1921 per flask of 75 pounds, as quoted by the Mining and Scientific Press for the San Francisco market, was \$47.42. The highest monthly average was \$50, in January and May; the lowest was \$40.40 in November. The average for December rose to \$49.50.

Never before has the quicksilver mining industry in the United States sunk to so low an ebb. The first recorded annual production was 7,723 flasks, in 1850, and from that year to 1920 inclusive the annual output has been 10,000 flasks or more—in fact in only five years has it been less than 20,000 flasks. In 1859 it was 13,000 flasks; in 1860, 10,000; in 1908, 19,750; in 1914, 16,548; and in 1920,

13,392. The maximum output, that of 1877, was 79,395 flasks. The output in 1921 was thus the smallest on record. The average price in 1921, although of course much lower than that for the years during and immediately after the war, nevertheless compares favorably with pre-war prices. The average price during the 10 years from 1904 to 1913, inclusive, was \$42.32, or \$5.10 per flask lower than the average in 1921. The cost of production, however, has not declined so rapidly as the price, and no large bodies of ore are now known that are comparable in tenor to those that were exploited when quicksilver mining in the United States could be considered a flourishing industry.

AMERICA'S FUTURE OIL RESOURCES

Although it is estimated that at the present rate of production the oil fields of the United States would be exhausted in about twenty years, these figures do not indicate that the country's petroleum resources will come to an end within that period, according to the National Bank of Commerce in New York. The country's wells are likely to show long periods of declining productivity before their final depletion, and the nation's huge deposits of oil shale offer enormous supplies as soon as it becomes economical to use them, the bank points out in its magazine, *Commerce Monthly*, for February. It says:

"If an annual rate of production of 450,000,000 barrels, a figure nearly reached in 1920 and probably exceeded in 1921, were to be maintained in the United States until the wells were exhausted, the known supply would run out in about 20 years. These old fields, however, are likely to show long periods of declining productivity before they are completely exhausted. It is impossible to estimate when the United States will have used up its petroleum resources, but a period of constantly decreasing production with occasional increases as new wells are opened up and new methods of recovery are instituted may be expected to begin within the next few years.

"To meet the emergency of a declining output of petroleum the United States has in reserve huge deposits of oil shale from which great quantities of petroleum products may be obtained when it becomes economical to produce them. Enormous amounts of oil shale rich in oil are found in northwestern Colorado, northeastern Utah, southwestern Wyoming and in northern Nevada. Deposits of more limited extent and generally less rich are located in Pennsylvania, Indiana, Kentucky, Texas, Wisconsin, Michigan, West Virginia and elsewhere. Though the oil shale industry is of long standing in other parts of the world, notably Scotland, France and Australia, it has not yet passed the experimental stage in the United States.

"The United States has long been pre-eminent in the petroleum industry, but it occupies the unenviable position of exhausting its resources much more rapidly than the rest of the world. Starting with a supply estimated at 14 billion barrels it has used up some 5 billion, leaving only about 9 billion barrels, or 64 per cent of its original resources, still available. On the other hand the world outside the United States is thought to have 56 billion barrels, or over 90 per cent of its original supply of approximately 60 billion barrels. As the United States regularly produces three-fifths or more of the world's annual output, each year finds this country in a relatively worse position.

"While the using up of natural resources is deplorable, still the material gains resulting from their exploitation should not be overlooked, for in a large measure the gradual exhaustion of American petroleum, has been off-set by the advances of American industries thus made possible."

BUREAU OF MINES INVESTIGATIONS.

A tentative program has been drawn up by the Bureau of Mines to an investigation of explosives used in the metal mines of the Southwest.

A study of the causes, symptoms, prevention, and treatment of mercury poisoning has been made under the direction of the Chief Surgeon of the Bureau of Mines.

The Alaska experiment station of the bureau of mines, at Fairbanks, has made a study of the possibilities of working the large, low-grade gold-bearing bench deposits along the Seventy-mile river by hydraulic methods, using the ditch water.

Results of tests on Ontario ore samples from Park City, Utah, made at the Intermountain Station, indicate that, if all the small quantities of sulphide minerals contained in the so-called oxidized ore can be removed, a high-grade recovery of the silver will be obtained.

In the study of the milling problems of the Missouri-Kansas-Oklahoma lead and zinc district, being conducted at the Mississippi Valley Experiment Station, Rolla, Mo., experimental work has been done to ascertain if rougher jig tailings after being given a tumbling in a ball mill would not be more amenable to jigging on a chat jig. These tests indicated that ball milling would make possible a tailing of 0.50 per cent lower in zinc than otherwise; this means that ball milling should increase profits.

Mine operators in the Tonopah, Nevada, district are having considerable trouble with drill steels, as different lots received require different heat treatment in tempering. At one mine the steel does not stand up in hard ground when used in the stopers with the outside water spray. At two different times in one mine the drill bits, after being used five or ten minutes, were noted to be at red heat, as drawn from the holes. The problem is being studied by the Bureau of Mines in the course of its general investigation of drill steels.

An investigation has been made as to the effects of dust, high temperatures and high humidities on the miners employed in the mines at Tonopah, Nevada. A report of the results of similar investigations in the Butte, Montana, mines is in preparation. An apparatus is being devised for the collection of samples of mine dust containing soluble lead in connection with the investigation of lead poisoning in the milling of lead carbonate in the mines of Utah. An investigation was recently made of the health hazards from lead in the manufacture of storage batteries by a California company.

In the course of flotation experiments, being conducted by the Moscow, Idaho, field office of the Bureau of Mines in co-operation with the Simon Silver-Lead Company, Mina Nevada, it has been found that hardwood creosote alone gave a fair differential separation of the galena and sphalerite. In combination with sodium di-basic phosphate, a marked flotation of the galena in preference to the sphalerite was given. Sodium carbonate and creosote gave better results than creosote alone, the same being true of permanganate.



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25 H.P. Gasoline Hoist	1000.00
25 H.P. Motor, 440 volt, 720 RPM	300.00
30 H.P. Motor, 440 volt, 720 RPM	325.00

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SALT LAKE MINING STOCK QUOTATIONS

The range of the market from January 27th, to February 10th, inclusive, Quotations furnished by J. A. Hogle & Co., direct wires to all leading markets, 169 So. Main St., Salt Lake City, Utah, and ground floor of Eccles Building, Ogden, Utah, and Pocatello, Idaho.

CLOSING								CLOSING							
Stock.	Open.	High.	Low.	L. S	Bid.	Asked.	Sales.	Stock.	Open.	High.	Low.	L. S	Bid.	Asked.	Sales.
Alta Mich. . . .	.02	.02½	.02	.02½	.01½	.03	6,000	Keystone . . . .					.10	1.00	
Antelope Star . .	¾	¾	¾	¾		¾	1,000	Kennebec . . . .	.07½	.07½	.07½	.07½	.06½	.08½	1,000
Alta Con. . . . .	.08	.08½	.05½	.07	.05	.08	8,100	Lehi Tin. . . . .	.02½	.03	.01½	.01½	.01½	.01½	30,583
Alta Tiger . . . .	.01	.01	¾	¾	¾	¾	13,000	Leonora . . . . .	.01½	.01½	.01½	.01½	.01½	.01½	6,000
Am. Con. Mns. . .	.02	.02½	.02	.02½	.01½	.04	2,000	Logger . . . . .	.01	.01	.01	.01		.01	2,000
Albion Cons. . . .	.10	.11½	.09½	.11½	.10	.11	7,015	Lynn Big Six . . .	.21½	.23	.20	.23	.23	.25	9,600
Am. Con. Cop. . .	.03	.03	.02	.02½	.02½	.02½	31,200	Mammoth . . . . .	.25	.28½	.25	.28½	.25		700
Alta Tun. . . . .	.17	.17	.13½	.16½	.16	.17	41,000	Miller Hill . . . .						.03	
Bullion . . . . .	.02	.02	.02	.02	.02	.04	2,000	May Day . . . . .	.01	.01	.01	.01		.02	500
Big Hill . . . . .	.02½	.02½	.02½	.02½	.02	.02½	4,000	Mason Valley . . .					1.25		
Big Cot. Coal. . .	.06	.06	.04½	.05	.04	.05½	4,353	Mich. Utah . . . .	.35½	.35½	.25	.26	.26	.26½	50,600
Beaver Cop. . . .	¾	¾	¾	¾	¾	¾	6,000	New Quincy . . . .	.04½	.04½	.03½	.04	.03½	.04	30,000
Bay State . . . .	.03	.03½	.03	.03	.01	.10	1,500	Nalldriver . . . . .					.05		
Black Metal . . .	.11	.13	.11	.13	.08	.12½	4,600	No. Standard . . .	.05	.05½	.04	.05½	.05½	.05½	71,334
Bingham Gal. . .	.01	.01	.01	.01	.01	.01½	21,700	O. K. Silver . . . .					.05		
Cent. Eureka . . .					¾	.02		Opohongo . . . . .	.01	.01	¾	¾	¾	¾	8,000
Cedar Tals . . . .					.01			Original Ban. . . .					¾		
Colb. Rexal . . . .	.29	.34	.27	.29	.28	.29½	17,450	Plutus . . . . .	.27	.27	.25	.25	.12	.26	1,000
Colorado Con. . .	.04	.04½	.04	.04½	.04	.04½	10,800	Prince Con. . . . .	.11	.13½	.06½	.07½	.06½	.07½	50,700
Crown Pt. . . . .	.02½	.03	.02½	.03	.02½	.03	5,000	Pioche Brist. . . .	.01½	.01½	¾	¾	¾	.01	9,000
Cardiff	1.02½	1.07½	1.00	1.07½	1.02½	1.10	3,500	Price Mining . . .	.05	.05½	.05	.05½	.05	.05½	12,000
Cott. King . . . .						.01		Provo . . . . .	.02½	.02½	.02½	.02½	.02½	.02½	9,000
Cott. Metals . . .					1.25	2.00		Rico Arg.					¾		
Daly					2.00	3.00		Reeds Pk. C. . . .	.01	.01½	.01	.01½	.01½	.02	2,000
Daly West . . . .					.05	.09		Rico Well					¾		
Dragon								So. Standard . . .	.12	.12	.12	.12	.12		500
Demijohn Con. . .					¾	¾		Sells . . . . .	.03	.03	.02½	.02½	.02½	.03	29,500
Emma Sil. . . . .	.02	.02	.01	.01½	.01½	.01½	112,552	Syndicate	¾	¾	¾	¾	¾	¾	10,000
Empire Mns. . . .	.03	.03½	.03	.03½	.03	.04	27,000	Sil. King Coal. . .	2.10	2.30	2.10	2.30	2.25	2.27½	3,800
E. & B. Bell					2.35		27,000	Sil. King Con. . . .	.55	.64	.50	.50	.46	.51	4,650
Emerald . . . . .	.04	.04	.04	.04	.02½	.04	1,000	Sioux Mines . . . .					.01	.02	
Eureka Mns. . . .	.04½	.05	.04	.04½	.04½	.05	7,500	Swansea Con. . . .	.01½	.01½	.01½	.01½	.01		5,000
E. Crown Pt. . . .	.03	.03½	.02½	.02½	.02½	.03	10,000	Silver Shield . . . .	.02½	.04½	.02½	.03½	.03	.03½	9,000
E. Tin. Coal. . . .	.01½	.01½	.01	.01	¾	.01½	18,500	Tecoma	¾	¾	¾	¾	¾	.01	4,000
E. Tin. Con. . . .					.05½			Tar Baby . . . . .	.03	.03	.02	.02	.02	.02½	6,000
East Antelope . .						.02		Tintic Cent. . . . .	.01½	.01½	.01½	.01½	.01	.01½	2,000
Eureka Lily . . . .	.08	.08	.07½	.07½	.07½	.08	4,000	Tin. Standard . . .	2.05	2.50	2.05	2.20	2.20	2.22½	15,197
Eureka Bul. . . .	.04½	.05½	.04½	.04½	.04½	.05	17,000	Uncle Sam . . . . .	.01½	.01½	.01	.01		.01	5,500
Gold Chain . . . .	.06	.06	.05½	.06	.05½	.07	2,000	Utah Con. . . . .	.01	.01	.01	.01		.01	4,500
Grand Cent. . . .	.41	.41½	.40	.41½	.40	.42	4,300	Union Chief . . . .					.01	.05	
Great West. . . .					.04½			Victor Con. . . . .	.01	.01	.01	.01		.01½	1,000
Hamburg Mns. . .					¾			Victor Mng. . . . .	.02	.02	.02	.02	.01	.03	2,000
Howell . . . . .	.04½	.05½	.04½	.05½	.05	.06	15,000	Whirlwind . . . . .						.02	
Hme Run . . . . .					.02			West Toledo . . . .	.03	.03	.03	.03		.02½	4,500
Iron Blossom . . .	.22	.22	.19	.20	.20	.20½	6,900	Walker Mng.	2.70	2.70	2.70	2.70	2.55	2.70	500
Indian Queen . .						¾		Woodlawn . . . . .					.08	.11	
Iron King . . . . .	.08	.08	.08	.08	.07	.10	3,000	Yankee Con. . . . .					.02	.06	
Judge M. & S. . .	3.00	3.00	3.00	3.00	2.90	4.00	1,100	Zuma . . . . .	.08	.13	.07½	.09	.08½	.09½	32,736

ASSESSMENTS PENDING

Combined Metals Mining Company, 1c. a share. Delinquent February 21st. Sale day March 21st.
 American Mining & Ex. Company, 1c. a share. Delinquent March 8th. Sale day May 27th.
 Stockton Standard Mining Company, ¼c. a share. Delinquent February 15th. Sale day March 15th.
 White Pine Silver Mines Company, 1c. a share. Delinquent March 2d. Sale day March 27th.
 New Quincy Mining Company, 1c. a share. Delinquent February 28th. Sale day March 20th.

ORE SHIPMENTS

Ore shipments from the mines of Park City for the three weeks ending on the 10th, amounted to 6,451 tons, as follows:

Judge Allied Companies1,328
 Ontario Silver Mines1,253
 Silver King Coalition2,019

Total tons6,451

Shipments from the mines of Tintic to the mills and smelters during the three-week period ending on the 10th, amounted to 413 carloads, as follows:

Tintic Standard168
 Chief Consolidated107
 Eagle & Blue Bell17
 Iron Blossom25
 Victoria22
 Colorado Consolidated10
 Swansea Consolidated10
 Bullion-Beck5
 Centennial-Eureka10
 Grand Central26
 Dragon Consolidated3
 Gemini4
 Alaska4
 Eureka Hill1
 Tintic Drain Tunnel1

Total carloads413

METAL MARKET QUOTATIONS, FEBRUARY 10th

Silver99¼c.
 Silver in London34½d.
 Copper13¼@13½c.
 Lead, New York\$4.70@4.80
 Spelter, East St. Louis.....\$4.50@4.55

EASTERN STOCK QUOTATIONS, FEBRUARY 10

Anaconda Copper47½@47½
 Butte & Superior25¼@26
 Chino Copper26@26½
 Ray Consolidated14@14
 Utah Copper60½@61
 Bingham Mines13@13½
 Daly West2¼@2½
 Mason Valley2¼@2½
 Utah Apex3@3¼
 Utah Consolidated2¼@2½

WANTED, POSITION—To connect with party that can use man six years superintendent and master mechanic California mine; eight years traveling erecting engineer and trouble man, engines, boilers and machinery manufacturing companies; ten years chief engineer electric light and power company. Expert on engines, pumps and air troubles. Thoroughly experienced engineer, millwright and machinist. Five years night school studying assaying and chemistry. Absolutely reliable, trustworthy, capable man. JOHN BEECHER, 1312 Octavia Street, San Francisco, Cal. —(Adv. 2t.)

RAISE BIG CAPITAL for any legitimate business; write for free copy "QUICK FINANCING" showing how large companies raise large capital by my easily operated method. Cunningham, Financial Specialist, 409 Grant Building, Los Angeles, Calif. (Adv.)

Wanted—Job by man and wife in mining camp. Wife to cook for men; man to work at mine. Address: H. E. Wagner, No. 7 So. Fourth East St., Salt Lake City, Utah. 2-it-30-15.

That the ordinary, innocent-appearing telephones used in the underground depths of coal mines are capable of igniting gas and thus bringing about disastrous mine explosions is the novel finding of an investigation just conducted by the United States Bureau of Mines at its experiment station at Pittsburgh, Pa. The danger of gas ignition and explosion does not exist in the employment of such current as is necessary for talking over telephones, but results from the ringing of the magneto.

The Salt Lake Mining Review

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SALT LAKE CITY, UTAH, FEBRUARY 28, 1922

SINGLE COPIES, 15 CENT

Oil Problems in the Uinta Basin. (V.)

By Prof. Earl Douglass.

Surface Indications—Gilsonite (II).—In the last paper the larger veins of gilsonite were described. It is a recognized fact that gilsonite and the other asphalts are the result of the evaporation and oxidation of petroleum. We found that, taking the estimates of Eldredge as to the quantity of gilsonite in the few large veins which he studied—and his estimates are apparently the minimum—it would take a large amount of oil, at least a quantity which cannot be ignored, to form these immense veins.

In this article we were to begin the search to see if it is possible to discover the source of these veins, and to ascertain when, where and how (under what conditions) they were formed. It is the legitimate business of the geologist to do this, if possible, and it is the course which seems to the writer far more likely to bring the desired practical results, in a new field, than to start off at once in the search of certain typical structures which, in many cases, have proven productive (but have in many other cases proven unproductive) in other fields with a different geological history and structure.

We have already given a number of facts which suggest structures that, so far as I am aware, have not been generally recognized here—structures which do, in many fields, influence the concentration of oil, and which also suggest an answer to one of the questions which were proposed in the last article regarding the manner of occurrence of the veins of gilsonite. I did not wish to give an opinion as to the significance of certain facts until more of the evidence was before the reader. Probably some have already anticipated the solution suggested by the facts. The data referred to are those concerning the length of the veins, their vertical position, the fact that they extend in certain directions and that they occur in groups and in parallel bands with spaces or zones of approximately the same width, apparently, as the bands between the zones. The mere drying out of the strata could hardly have formed these veins—or fissures for the veins—in the manner in which they occur. We will say more of this when we come to the discussion of fissures.

It was seen that the veins of the Bonanza group occur principally in the heavy sandstones of the Lower Uinta and Middle Uinta deposits. These beds have been designated in part, at least, and in a hazy and undefined manner, as Bridger. It is not the wish of the writer to confuse or "scare" the reader with technical geological terms or with worthy discussions until it becomes necessary for the clearer understanding of the problems to be solved; but experience has shown him how extremely unsafe it is, without the evidence of fossils or the certain identification of beds both above and below a formation, to correlate it with a discontinuous or distant formation.

The typical Bridger beds are in the Bridger Basin in

Wyoming. They have been divided on the basis of their fossil mammalian faunas into a half dozen successive horizons. They are rich in mammalian and reptilian fossils. Of the former, probably over 200 species have been discovered. It is true that 600 feet or more above, the bottom of what is called the Lower Uinta here, fossil mammals have been found which resemble those of one or two horizons or levels in the Bridger Basin.

So far as I am aware no identifiable fossils have been collected in the lower 500 or 600 feet of the so-called Lower Uinta. There now seems hope that such will be collected and studied; but a large amount of field work, of collecting, laboratory study and comparison are necessary to identify, correlate, distinguish the divisions and map the various Tertiary horizons which overlie the Green River deposits



Fissured Green River shales filled with veinlets of gilsonite, about 250 feet below the top of the formation. The rock below is tough, dark, crinkly oil shale which resists weathering and fracturing. The gentleman, Dr. Fraucke, is seen sitting at the junction of the two kinds of rock.

south, east and north of the Uinta mountains. Until this is done, we will avoid misunderstanding, confusion and probable error by designating these beds by their local names.

Cretaceous and Tertiary Formations in the Uinta Basin

To get an understanding of the conditions in regard to the oil, it will be necessary to become familiar with the different divisions of the Cretaceous and Tertiary deposits here. Below is a list of the names of the formations as they will be used in these articles. The upper are the youngest the lower the oldest.

TERTIARY.—Upper Uinta.—"C," of Peterson; Middle Uinta.—Uinta "B," of Peterson; Lower Uinta.—Uinta "A," of Peterson; Upper Green River; Middle Green River; Lower Green River; Wasatch.

CRETACEOUS.—Mesa Verde; Mancos; Mowery Shales; Dakota.

Please get these fixed in your minds "right side up with care."

In trying to discover the source of the gilsonite, we should begin with the sandstones and shaly sands in which the larger dykes are found. Usually these deposits do not show strong indications of being impregnated with oil or asphalt here, though it is probable that, in places, tests for oil can be obtained. If amounts sufficient to form these large veins came from these sandstones, it seems almost certain that they would be highly impregnated in places with oil or asphalt. It is true that, in some places, low in the deposits the sandstones on both sides of the dykes are impregnated; but this saturation apparently comes from the veins rather than the veins from the saturated rocks.

The weight of evidence and opinion at present seems to be in favor of the belief that the greater part of the petroleum in the earth originated in shales—usually of dark color—which are, or were, rich in organic matter; though some favor the theory that a large part of it originated in limestones which were formed of the shells and other hard parts of animals. In the latter case it is supposed that the soft parts of the animals have been entrapped and have formed the oil.

In the Uinta formations here there is very little limestone and the sandstones and sandy shales, though some-

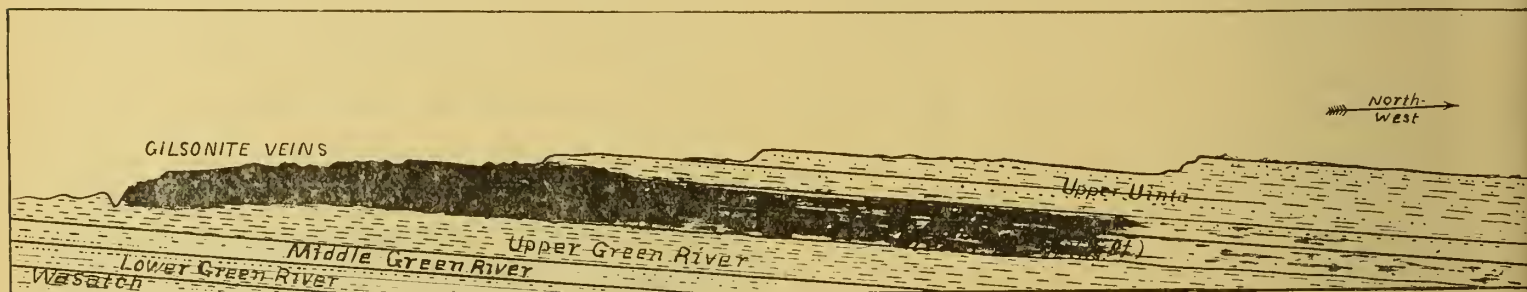
that the Upper Uinta, at least in part, was deposited after the veins were formed. Formerly these deposits undoubtedly covered the older Uinta deposits to the southward.

Farther west, on what is termed "the reservation," the lower part of the Upper Uinta has much more heavy-bedded sandstone and the next zone of gilsonite veins west of the Bonanza group extend far to the northwestward cutting into these sandstones in the region of Randlett, Ft. Duchesne and Moffat, but probably feather out in the softer overlying beds to the northward.

If the above explanation of the pinching out to the northward be the true one, it would solve the mystery of the absence of surface-debris and animal-remains in the gilsonite; as the veins did not open to the surface, but pinched into in the Upper Uinta. This will be better understood after we have made a study of the behavior of rocks (fissuring, etc.,) under strain.

In the bad-land deposits of the Upper Uinta of the eastern portion of the basin which lies in Utah we do not find the type of a formation which impresses us as being the source of the great dykes of hydrocarbons. It is true that farther to the westward, on "the reservation," as we shall see later, there are bands of carbonaceous shale which, in thin bands, are almost made up of vegetable matter, and these shales give tests for oil. The interbedded sandstones are also in many places saturated.

We will make one more quest and if we do not find



times showing a few traces of organisms, do not, as a rule, appear to be rich in organic matter. These formations, however, change much from place to place, and what is said of them here will not apply to the same deposits farther to the west.* They are undoubtedly river, flood-plain, delta, marsh and lake deposits; and therefore change very much locally. We will, however, discard the probability of the petroleum originating in these beds until we have made an effort to find a more obvious source.

The possibility that the oil originated in other beds or other localities and migrated to these sands, or part of them, will be considered later.

Tracing Out Gilsonite's Origin

Let us now trace these dykes to the northwestward to see if we can find the origin of the gilsonite there, as Eldredge says they die out or feather out there. In the region of the Bonanza and Cowboy veins, where they have been worked, the Upper Uinta has been eroded away; but farther to the north it appears in bad-land hills and southwest facing bad-land bluffs or escarpments.

Therefore, in tracing the veins to the northwestward we are really tracing them up into the overlying Upper Uinta where the veins soon die out. This feathering out is probably due to the fact that so large a proportion of these deposits is unconsolidated sandy clays which would take up the strain by movement of the particles rather than by fissuring. If they ended abruptly, we might infer

some strata below which seem adequate to furnish the amount of oil required, we may make a more careful search in the Uinta formations.

Let us select some advantageous place, in the northern portion of the part of the Uinta Basin which lies in Utah, for observation. We are standing on some bench or mesa. Beneath our feet is the Upper Uinta, and probably each formation enumerated above, lies in succession deeper and deeper beneath our feet. As we go to the southward we descend, at long intervals, a series of great steps or terraces to the level of older and older deposits. We come to where the Upper Uinta ends in a line of cliffs. South of here we see it no more, as it has been washed away, and the Middle Uinta appears. Still farther to the south this formation vanishes and the Green River appears, and then in succession the Wasatch, the Mesa Verde, and the Mancos.

If we could have photographs which had been taken at intervals of a hundred years, for a million years or more, and if we had them combined in a continuous film and thrown on the screen we would apparently see these terraces or escarpments all beginning farther to the southward and gradually receding toward the north, each successive one at different rates, depending on the hardness or softness of the rocks and other conditions which accelerate or retard erosion.

The conditions being as above described, it will be seen that if we follow the formations which contain the gilsonite to the southward, we will pass over their exposed edges and, if the rocks are not covered up, there should

*Note. -I have not tested them myself but I have heard it reported that the Uinta sandstones here do contain some oil.

be an opportunity to trace these veins down into the Green River, if they extend downward into that formation.

We will follow the Bonanza vein—or the Bonanza veins, as they are now united—to the southeastward over the undulating benchland to the brow of the short deep canyon which enters White River. The bluffs here are capped by the Lower Uinta sandstones. On the top of the bench the course of the veins is marked by occasional prospect holes.

As the veins have been covered by debris, we draw a line with these prospect holes to see where they go over the rim of the bluff. A little below the top we see fragments of gilsonite. We dig away the debris and find small veins of this material. We dig farther and find that there are several veins with a general prependicular course anastomosing or “running into each other.” As it is often expressed, the sandstone “is shot full” of veins.

We now go a little lower and follow a bare-faced ledge or terrace of more shaly rock to see if we can find signs of gilsonite or any clue to its origin. Little, if any, is found; but we descend to a lower level and follow another ledge



Sandy Shales near the top of the Green River formation cut through with veins of gilsonite. The cliffs above are Lower Uinta sandstones, and the Bonanza vein comes over the brow of the bluffs to the right of the cliff.

back. Here we find pockets and streaks of a black hydrocarbon which is undoubtedly “the thing we are after.”

We are now in the Green River shales. When we get back to the line of the larger vein we see several veinlets cutting through the shale and extending upward toward the larger vein.

We then go a little farther along the bluff to the southeastward, where there is an overhanging cliff of the capping sandstone and the shales are more bare. We see the latter again “shot through” with veins of gilsonite. We go still farther and see more of these; and, in places, the shales look oily on the surface.

A little above, where the shales are changing to sandstones, there is a gilsonite vein running along the bedding-plane. Some of the rock is saturated with asphalt and oil. Cavities in the rock are partly filled with gilsonite which is sometimes associated with some other mineral or minerals. One feels that he is getting near the source of the mystery which has surrounded these veins of gilsonite.

A small portion of the dark sand or sandy shale, when put into a test tube with chloroform, suddenly turns the latter to an amber or dark reddish-brown color. Samples

of finer shales which split into thin laminae, when put in chloroform, show a dark oil-ring on top of the chloroform.

In testing for oil in this way one should pour the solution into a clean test tube; as reflection from the shale in the bottom of the tube will show a dark ring. Sometimes the oil has been naturally filtered in its migration through certain kinds of rock and it is so transparent that one is doubtful whether it is an oil-ring or not. To be sure about it one should pour the solution on a small white porcelain dish and let the chloroform evaporate. If there is oil it will remain on the dish as an oily residue. If it is asphalt it will be dark and sticky and have a peculiar rank odor which one soon learns to recognize.

We descend the slopes carefully as they are steep and treacherous. We examine the steep-faced cliffs and in many places see small veins of gilsonite cutting the shale perpendicularly. The rock now is nearly all of a shaly or slaty nature and is quite uniform in color being, on the surface, a light greenish-gray, though darker bands are seen. These shales are everywhere interesting and nearly everywhere show “signs” of oil; indeed it is doubtful if one could find a sample of rock here, except at the weathered surface, which would not give a test for oil. These shales, however, will be more thoroughly described later.

In the next article we will see if other veins can be traced down into the Green River formation.

Note.—Errata.—In article III (Dec. 30, 1921), page 9, column one, fifth paragraph, last line, instead of “compounds of hydrogen and oxygen” read compounds of hydrogen and carbon.

In 9th line from bottom insert, “often containing compounds,” between “made” and “higher”.

PLACER MINING METHODS

The cheapest method of handling gravel in placer mining operations is by hydraulic mining, according to a paper issued by the bureau of mines during the past month. In working gravel deposits by hydraulic mining, it is essential that an abundant supply of water under sufficient head can be economically developed and that there is sufficient grade for sluice boxes and for disposal of the tailing. Without dumping facilities, simple hydraulic mining is an impossibility. The cost of hydraulic mining may range from 2½ cents a yard under favorable conditions to 12 or even 20 cents under less favorable conditions and to 35 cents or more a yard in Alaska, according to conditions of operation, and if frozen gravel is encountered. When it is necessary to elevate gravel, the costs may exceed 60 cents a cubic yard.

When the natural conditions do not permit of hydraulic mining proper, other methods of elevating the grade are employed, some of which are described below.

Bucket dredging has replaced hydraulic mining in importance in California and other states where hydraulic mining was once extensively carried on, and is by far the cheapest method of elevating gravel when mechanical methods are required and the physical conditions are suitable for dredging. Dredging costs vary greatly under the different conditions encountered, and the total amount of gold to be recovered must of course be enough to warrant the cost of a dredge installation. Gold dredging operations in the United States are fully described in bulletin 127, U. S. Bureau of Mines.

Hydraulic and Rubble Elevators

When there is an abundance of water available under natural head, but the grade is insufficient to dispose of the tailing, a hydraulic elevator can be used. A large quantity of water is required and the efficiency of the elevator varies between 10 to 5 to 1, that is, from five to ten feet of head is required for one foot of lift. The proportions of solids to

water is estimated at from 1.7 to 2.5 per cent. It is also roughly figured that about two-thirds of the water available is required for the elevator and one-third for the giant. At the Logan mine near Waldo, Oregon, with 40 cubic feet of water a second, 15,000 to 30,000 cubic yards of gravel is washed per month. Four giants are used, two in the pit and two on the tailing dump. A 20-inch hydraulic elevator with two lifts elevates the material 49 feet. The gravel is easily washed, there are no large boulders, and the operating expenses are said to be only three and seven-eighths cents per cubic yard under exceedingly favorable conditions.

Another form of elevator for hydraulic mining is known as the rubble. The rubble elevator consists of an approach or apron running from the bedrock up into the elevator, which is an inclined trough, on a 17 degree pitch, 80 to 100 feet long and 8 feet wide, with sides tapering from 12 feet high at the bottom to 6 feet at the upper end. In addition to the apron, which is 10 feet long, the first 20 feet of the incline is solid and lined on the bottom and sides with three-eighths-inch steel. From these solid plates, to the end of the incline are grizzly bars of timber $2\frac{1}{2}$ by 6 inches, placed $2\frac{1}{2}$ inches apart and covered with steel bars three-eighths inch thick. The fines from the grizzly pass to the sluice box, which extends from the grizzly to one side of the machine.

The method of operation of one of these machines at Red Hill, Cal., was as follows: The elevator or drive giant is set about 80 feet in front of the elevator. The field giants deliver material to the front of the elevator, and the material is then handled by the elevator or drive giant. In the operation of the elevator giant skilled "pipers" are required, as careless or inexperienced handling of the giant may cause fine material and some gold to be driven through the elevator. The depth of the bank was 20 to 25 feet, the gravel ores containing large boulders up to 5 tons. Water was furnished under a pressure of 450 feet to two No. 3 giants. The capacity with 600 to 1,000 inches of water was 1,000 to 1,200 cubic yards a day, and in one run 10,000 yards was put through the machine at an operating cost of less than 5 cents per cubic yard.

Gravel Pumping

Where water for hydraulicking is not available or where there is not sufficient grade to dispose of hydraulic tailing and not water enough to supply a hydraulic elevator, but enough water to supply one or two giants, the gravel is generally elevated by means of gravel pumps to a height sufficient to dispose of the tailing. The gravel pump has been popular in Australia in gold and tin mining, in the Malay states in tin mining and has also been used in some California districts to more or less advantage. It has, however, been replaced by bucket dredges in recent years when the ground is suitable for dredges on account of the greater efficiency and lower operating cost of the dredge.

The following has been found to be true: Gravel pumps in general use are from 6 inches to 14 inches, though larger sizes are made. They are supplied with renewal shoes and liners as there is great wear upon these parts. The pump may be placed upon a pontoon as in the case of the pump dredge or it may be firmly set at a more permanent station on bedrock. The suction pipe is moveable and can be extended 200 feet or more from the pump. The pontoon of the pump dredge rests on bedrock and can be moved to a new location by flooding the working and floating the pontoon. The following description is of mining by combined hydraulicking and gravel pumping: The ground broken down by the giant is driven to a sump from which the pump suction is fed, the boulders and larger stones being removed before reaching the sump.

The gravel pump delivers the hydraulicked material to

a sluice placed at a height convenient to dispose of the tailing, generally 40 to 50 feet high. Where greater height is necessary, stage pumps may be required. The pump discharges onto a grizzly placed over the sluice box, the over-size going to a dump or to a truck on rails which is trammed to a dump. The fines go to the sluices which are fitted with riffles according to the fancy of the operator. The most popular sluices are made of sheet steel and can be obtained from dealers in mining supplies.

The efficiency of the gravel pump is low on account of the small proportions of solids, generally 5 to 8 per cent only that can be handled by the pump. An eight-inch pump under favorable conditions, at one plant, elevated 24 cu. yds. an hour, 40 feet height, using about 50 h.p. Costs vary according to different conditions encountered but can be roughly estimated at 25 cents a cubic yard.

Pumping to Secure Artificial Head

Where water under sufficient head for hydraulicking is not available, but there is a large amount of water in a nearby river or creek, an artificial head may be secured by the use of multi-stage centrifugal pumps. This method has some advantage where cheap power is available, as it does away with expensive installation of long pipe lines. The cost of pumping may however, prove uneconomical as considerable power is required.

At one plant, a 2-stage centrifugal pump was used to take water from a creek. This pump was directly connected to a 100-h.p. motor. The pump delivered 115-cu. ft. a minute through a one and three-quarter-in. nozzle at a pressure of 100 lbs.

With the exception of the bucket-elevator dredge, the most successful excavating machines used in gold placer mines are the ordinary steam shovel and the drag-line bucket excavator with the bucket working on a boom. Both of these machines are used to advantage in digging canals for irrigation and drainage. There the question of handling the material presents no great difficulties; the only problem is to obtain an efficient digging machine, as the disposition of the material dug on either side of the cut is a simple matter. In placer mining operations, however, these machines have rarely proved a success on account of the heavy cost of operation. Where tried in California, the cost of placer mining by this method has been 17 cents or more per cubic

Beach Mining and Dry Placering

A form of gold mining somewhat peculiar to the Pacific coast is the method used in mining the heavy black sand of the ocean beaches, especially near the mouths of rivers draining areas that carry auriferous gravels. These beaches are worked intermittently, more particularly after storms when the overburden of ordinary beach sand has washed away, leaving the black and heavier sand behind. These sands are washed in toms or sluices or are handled by concentrators. Repeated efforts to mine these sands on a large scale have met with failure and the output of gold and platinum from this source is not of great importance.

Attempts have been made to work so-called dry placers but without much success though individuals may, with small hand-blowing machines, often win a day's pay. The most serious attempt to work placer deposits with an air-blowing machine, coming to the writer's attention, was with what is known as the "Stebbins-Quinner" machine. The gravel was first dug with a steam shovel, pulverized and screened by the machine and passed over the Stebbins tables which use air instead of water, as a means of concentration. No large-scale operation is known to have been successfully handled by this method. No attempt has been made in this paper to describe the simple forms of sluicing or of wing darning or booming methods of gravel mining.

Oxy-Gas Torches For Mines

By Letson Balliet, Efficiency Engineer

During the time that Mr. Balliet was employed as Efficiency Engineer in the building industry, he carried on a great amount of research work, with heat treatment of steel, and when the acetylene demand was so great that it was feared supply would not be great enough, he had miles and miles of pipe lines to carry city gas, and mixed gas, to all parts of the great shipyard, and therefor all steel cutting and flanging, pipe bending, toolmaking, tempering steel, rivet tining, soldering and brazing, was done with city gas.

The records of Mr. Balliet's work have been published in England, Australia, United Kingdom, France and Germany, and many modern ship yards and steel works now are using the methods that Mr. Balliet developed as an expert on fuel combustion.

One article on Oxygen in Steel Cutting has been reprinted until over 3,000,000 copies have been printed, and is regarded as a text of the highest authority upon oxygen in steel cutting. The Literary Digest, and other journals have reprinted most of the article, some of them have published it complete.

In the following article Mr. Balliet simply calls your attention to the simplicity of gas torches and suggests a few uses that make it advantageous equipment for the smallest mine. Agents selling equipment will give full instructions on operation. Portuguese, Italians, Mexicans and boys were trained to use it in shipyards in a few days. Mine mechanics can learn to use it in a few hours. Efficiency will increase their knowledge and efficiency.

When the oxy-acetylene, or oxy-hydrogen torch is mentioned the ordinary workman regards it something of a mystery, something awesome or uncanny. He thinks that it can be used only where expense is no object. In fact, it is a very simple thing for any one to use it in the great majority of work, and will be found a most economic aid around the mine blacksmith shop. Every plumber, blacksmith, tinsmith, and machinist is familiar with the gasoline "low-torch" as it is commonly called.

The theory of that torch is to change the gasoline liquid into a gas, which is then forced, under pressure, through a small orifice, thence through an open space where it gathers its required volume of air, and thence through a short piece of pipe which acts as a mixing chamber. Theoretically every molecule of gas is supposed to be mixed in this mixing chamber that it is in contact with the exact number of molecules of oxygen that it requires for complete combustion.

The oxy-acetylene torch accomplishes exactly the same thing, in a little different way. Instead of forcing the acetylene gas out into a mixing chamber of atmospheric air it supplies the oxygen for combustion through a parallel pipe, mixing the acetylene gas and the oxygen inside the torch, and then forcing the completely combustible mixture out through the orifice where it burns with a hot flame very close to the tip.

Notice now, the difference—one you force the gas out into a mixing chamber of oxygen (air) and the other you mix with oxygen inside the torch.

It is customary to use oxygen which has been compressed in cylinders, with the acetylene torch, but compressed air from your mine compressors will answer the purpose for a great part of the work.

If acetylene is expensive or hard to get use gasoline gas with a torch in the same manner you would the acetylene gas. In fact for cutting steel, bending rails, pipe or bars, city gas, producer gas, gasoline gas, hydrogen, benzine or almost any old kind of fuel gas will do just as well as acetylene, and be cheaper. I am going to repeat the words "just as well," because these gases are not a make-shift; they are an economy over the high priced acetylene. In fact I piped a great shipyard with city gas under 25 pounds pressure, and totally discarded acetylene for steel cutting, brazing, pipe bending, and flanging saving over \$600 a day. Acetylene was thereafter used only for welding. Other shipyards and steel plants and pipe works immediately installed city gas for steel cutting on the Balliet method. Even the city gas company at San Francisco has established a demonstrating room to show industrial managers and operators that city gas will equal acetylene in cutting steel, at much less expense.

Gasoline can be obtained at most any mine, hence I shall base my comparisons for this article upon gasoline and acetylene. All ordinary fuels are composed of Carbon (C) and Hydrogen (H) in varying relations.

PROPERTIES OF GASOLINE AND ACETYLENE

GAS	Symbol	B. T. U. per pound	B. T. U. per cu. foot of vapor.	Cu. ft. of air required per cu. ft. of gas	Cu. feet of pure oxygen req'd per cu. ft. of gas
Acetylene	C_2H_2	21,420	1,600	11.90	2.5
Gasoline	C_8H_{18}	20,912	5,120	45.23	9.5

Note that *three tenths* (.3) cubic foot of gasoline vapor has the same number of heat units (b. t. u.) as one cubic foot of acetylene. It is a heavier, denser gas than acetylene, requires a third less to give the same heat, and requires almost four times as much oxygen per cubic foot, but only about 15% more oxygen per b. t. u. This table may also give you an idea of what your automobile carburetor is intended to do.

There is nothing mysterious about all that. You know why you use the compressed air in the blacksmith's forge—to make the fuel burn faster. The more fuel you burn per second the hotter the fire becomes, within the close limits of the fire. The closer to the tuyere or tip that the fuel is consumed the more intense is the heat, hence the blacksmith says "the air makes a hotter fire."

Air is not a fuel, neither is oxygen. It is noncombustible, non-explosive, and it will not burn. Neither oxygen nor air have any b. t. u. value as fuel. But when the oxygen combines with a fuel, whether liquid, solid or gaseous, the combination is called burning. In no way can oxygen (or air) increase the number of heat units per pound in any fuel. It can increase the speed of burning—make the flame hotter and shorter.

To illustrate, a pound of fuel burned in a small closet might heat it to suffocation, while the same pound of fuel burned in a big auditorium would have its heat so widely spread out that it would not be noticed as heating at all, yet the fuel would give exactly the same number of heat units in both cases.

With all this in mind, it must be obvious to you that a torch similarly designed to the acetylene torch, will be a mighty big cost saver around any mine.

A cylinder of oxygen is worth about \$2 per 100 cubic feet (f. o. b.) A small portable generator for acetylene should be standard equipment for every mine. The same carbide that is used in the carbide miners' lamps will make acetylene gas if you need it. A prestolite tank from any garage will be the same. Prestolite is dissolved acetylene.

With this equipment, a leak in your air pipe or water pipes can be welded in a few minutes. A welded compound or reversed elbow can be made, or a piece can be welded into a cog wheel, a broken casting can be welded without taking it from the grounds and there are hundreds of places where such an equipment, which costs but little, will pay for itself in a few days. Sometimes one hour's work will save a month's shut down of some parts of the plant.

As another angle of economy the apparatus may be used with gasoline and compressed air, for forcing a tight drum or pulley from a shaft on which it has been shrunk, for making pipe bends or sharp bends in metal, for cutting rail and pipe, burning out a bolt hole in a plate, cutting off the head of a rusty bolt, burning a hole in a concrete wall, for soldering, brazing and the like.

It is occasionally a very useful apparatus for the assayer in his experimental work.

But don't be afraid of the oxygen! It's the same gas that is used in the masks worn by the mine rescue team. If any of it escapes in a room it only makes the air better, and if you breathe it long enough it will cure consumption. Timidity and unfamiliarity of the general public with oxygen is preventing much economy that might be effected.

Acetylene like gasoline is dangerous. Acetylene generators should NEVER carry over 15 pounds pressure. Other gases you can compress to higher pressures.

A great amount of talk and newspaper interest has been directed toward the "intense heat of the oxy-acetylene flame" cutting the side out of a sunken submarine, burning the steel beams in the Knickerbocker theatre disaster, and the burning of the front out of two burglar proof safes, was heralded as great feats of the "intense heat of the oxy-acetylene torch."

It was nothing of the kind. In no case was it necessary to heat the steel over 1,400 degrees F. and most blacksmiths heat drill steel to 1,800 degrees or hotter to sharpen it. Red hot iron will burn, when it comes in contact with oxygen and you can heat a piece of steel over your blacksmith forge, and with a jet of oxygen cut it in two without any acetylene or other method of heating. You can cut the door out of any burglar proof safe that was ever made with city gas or a gasoline torch, with a jet of oxygen. Anything that will heat steel to a red heat will let the iron burn when the oxygen jet hits it.

Not so with welding. In that case you must heat the edges of the two pieces to be welded in a reducing flame (with no excess of oxygen) until the metal melts, and then fill in with melted metal from the welding rod, allowing it to cool, thus making it one piece. This temperature, with steel, has to be around 2,500 to 2,600 or whatever the fusing point of the metal composition may be.

Acetylene is the best gas for welding, though some experiments have been successful with other gases under special conditions.

Some other time, I'll tell you how you can equip the mine with a simple appliance that will permit welding with electricity from your lighting or power circuits.

Mining Outlook Around Goldfield

By Al H. Martin

Goldfield, Nev., February 18.—Purchase of the Nevada Eagle gold property by the Kewanas Mining Company, for \$80,000 has swerved attention of local operators to the inviting field northwest of Goldfield. The Nevada Eagle lies about three and one-half miles northwest of the heart of Goldfield and has been undergoing comprehensive development for several years. The main shaft is down 450 feet but the bulk of work has been performed on the 250-foot level where three large veins of milling ore have been exposed, together with shoots of shipping material. A winze from this level has exposed ore sampling \$58 per ton in gold. The property is well equipped and the Kewanas Company plans to develop the ore-bodies on the 350 level, ship the richer material and block out the medium-grade product for treatment on the ground. The Kewanas is one of the oldest companies in Goldfield and the new deal is expected to shortly place the corporation among the foremost gold producers of southern Nevada. A. I. D'Arcy is general manager and consulting engineer, and H. G. McMahon secretary.

With the approach of spring the Paddy Pride Company, operating the Paddy Pride silver-lead-gold property near Shoshone, is preparing for operations along greatly broadened lines. Besides continuing shipments of high-grade ore to Salt Lake smelters the management plans to speed up development of the medium-grade product and maintain heavy shipments of this product to the nearby concentrator of the Tecopa Consolidated Company. Ore developments have been so exceptionally satisfactory in the past few weeks that the future of the enterprise is assured.

The company is deriving substantial monthly profits from its high-grade shipments and expects to start payment of dividends at no distant date.

Shipments are proceeding at the rate of one carload per week, with the material sampling around \$65 per ton, and all the ore sent out is broken down in routine development work. Plans for a mill of 150 tons daily capacity have been drawn and erection of this plant will probably be undertaken at an early date. The new ledge recently opened on the 250 level is developing into a massive ore body with both faces of the drift in excellent material. So far it has been exposed for a length exceeding 100 feet. The main orebody has been proven to a depth exceeding 300 feet and future plans include opening of the deposit to considerable depth below the proven area. John T. Overbury, of Tonopah, is general manager and secretary.

The three-compartment vertical shaft of the Goldfield Deep Mines is in dacite and has passed the 1,100-foot point. It is expected to be down 1,600 feet by March 15, when a station will be cut, pumps installed and sinking to the objective of 2,400 feet resumed. At this point comprehensive lateral work will be prosecuted with the purpose of opening the Florence-Goldfield Consolidated vein in the alaskite, beyond the barren shale intrusion. The project is attracting keen interest, as on the results of the enterprise largely depends the future of the Goldfield district.

The Goldfield Development Company reports its workings from the 200 level of the Gold Hill shaft are expected to interest the east segment of the main ore-body soon. The west segment is fully 23 feet wide at this depth, with the entire orebody said to average better than \$10 per ton in gold. The Crackerjack Company is preparing to develop the Park group, adjoining the Gold Hill. Over twenty leasing companies are working on the Florence and Goldfield Consolidated and several are shipping high-grade ore.

The main tunnel on the Austin Nevada Consolidated group, at Austin, has intersected the first of a series of famous veins known to traverse the group. Colonel H. G. Richardson, president and general manager, is concentrating all work on completion of the tunnel, to be followed by comprehensive lateral developments. The vein-system traversing the Austin Nevada Consolidated yielded over \$40,000,000 in the adjoining Austin Manhattan property, and in addition to these ledges several rich gold veins have been demonstrated. It is the plan of the management to later construct a large mill.

MANGANESE IN 1921

The domestic shipments of high-grade manganese ore—containing 35 per cent or more metallic manganese—amounted to about 13,000 gross tons in 1921, of which more than 10,000 tons was shipped from Montana, according to H. A. C. Jenison, of the United States Geological Survey, Department of the Interior. The shipments of ore containing 10 to 35 per cent of manganese amounted to about 72,000 tons, most of which was shipped from Minnesota. The shipments of manganiferous and ferruginous manganese ore amounted to about 14,000 tons.

The net imports for the first eleven months of the year amounted to 386,405 tons of high-grade ore and oxide, valued at \$3,288,595. Of this Brazil contributed 247,568 tons, valued at \$7.58 per ton, and India 113,730 tons, valued at \$6.46 per ton.

The most important event that may affect the future of the domestic industry was a favorable report by the House of Representatives on a proposed tariff on imports of manganese ore of 1 cent per pound of metallic manganese content of ore or of concentrates containing more than 30 per cent of metallic manganese. The measure has not been reported on by the Senate committee.

MAGNITUDE OF ANACONDA'S OPERATIONS TOLD AT MONTANA TAXPAYERS' MEETING

The organization of "taxpayers' leagues" has become one of Montana's chief activities during the past year or so. A convention of these leagues was in session at Billings on the 15th and speakers representing various industries, including farming, stockraising, mining, etc., were named in the program. The purpose of the convention, evidently, was to discuss ways and means of cutting the costs of government and thus reduce the burden of taxation which, in Montana—the same as in Utah and other states—is rapidly reaching the back-breaking point.

One speaker at that convention—Dan M. Kelly, representing the Anaconda Copper Mining Company, told the assembled taxpayers a few things about that mammoth corporation's activities and the part it played in the state's prosperity that they are not likely soon to forget. He showed that the Anaconda company paid 15½% of the total state taxes; he showed that the company, during the past five years had contributed toward maintenance of the state government the sum of \$6,323,576; that the company's net return on operations during that period was \$33,309,378, and which included two of the most prosperous years in the company's history. The taxes mentioned included only those paid in Montana, and amounted, approximately to \$19 for every \$100 returned to it from its Montana operations.

At one point in his address Mr. Kelly called attention to what the Anaconda's payroll meant to the state. "Yet," said he, "the taxes paid by this company, heavy as they are, constitute but a small portion of its contribution to the development of this great state. The practical shut-down of the year just past made all of us appreciate the importance of industries of this kind. When this company is operating at full capacity it employs more than 20,000 men. During the last ten years the expenditures of the Anaconda Copper Mining Company in the state of Montana were as follows:

Wages	\$230,928,887.19
Freight	45,732,121.28
Fuel and power	30,313,262.45
Lumber and timber	13,692,560.47
Supplies	79,035,831.86
Taxes	10,311,081.43
(Taxes does not include taxes paid to the federal government.)	
Miscellaneous and insurance	20,159,318.96
Custom ores	34,259,370.97
Total	\$464,432,434.61

"making an average expenditure per year of \$46,443,243.46, per month of \$3,870,270.29, or an average expenditure per day, including Sundays and holidays, of \$129,009.01."

Mr. Kelly then proceeded to show what that meant to the farmers and business men of the state, figuring it right down to individual expenditures of the company's employees under normal conditions, when 20,000 men are receiving \$36,000,000 a year on payroll account. The speaker then entered into a constructive discussion of what the people of the state ought to do to bring about an era of unexampled prosperity, covering its latent resources and how the company he represented had worked hard to accomplish what it had done. In closing his remarkably lucid review of the taxing situation in the state, Mr. Kelly said:

"Let us hope that the outcome of taxpayers' organizations in this state may result, not in agitation, discontent and discord, but, with the combined efforts of all, in placing this government upon a sound financial basis with reasonable and fair exactions from every one, and that thrifty

people and an abundance of capital may be encouraged to develop the resources of our state. If that is done, within a few years there will be sufficient wealth within our borders to support, on a fair basis of taxation, institutions that will not be excelled in any state in this Union."

PARK CITY M. & S. CO. ORGANIZED

With a capital stock of 1,500,000 shares and a par value of \$5 each, or \$7,500,000, the Park City Mining & Smelting Company was incorporated under the laws of Colorado about the middle of the month, thus confirming the news published in the two previous issues of the Salt Lake Mining Review. The officers of the new company are G. W. Lambourne, president, treasurer and managing director; Moylan C. Fox, vice-president; Oscar N. Friendly, manager; Geo. S. Kruegar, superintendent of mines; D. C. Murphy, secretary; W. A. Dunn, assistant secretary. The directors are Otto Luedekin of Cincinnati, Harry M. Stone-metz of Boston, Adolph G. E. Hanke of New York, O. N. Friendly, of Park City, Moylan C. Fox, Wm. M. Bradley and G. W. Lambourne of Salt Lake City.

According to official announcement, made upon the arrival home of President Lambourne on the 16th, the stock of the new company is all in the treasury to be issued as necessary in the acquirement of properties, etc.

At the wind-up meeting of the Daly West Mining Company in Denver it was unanimously decided to transfer the Daly West mines to the new company for 250,000 shares of the new Park City Mining & Smelting Company, which is a share-for-share basis.

Stockholders of the Judge Mining & Smelting Company will shortly be invited to join the new concern on an equitable basis and other deals, mentioned previously in the Mining Review, will unquestionably be made, as that was the object in capitalizing the new company for 1,500,000 shares.

Thus, one of the biggest undertakings in a mining way in Utah has been launched as a result of the determination and untiring efforts of Mr. Lambourne, who has been looking into the future possibilities and potentialities of a gigantic merger of Park City mines for years. It is therefore safe to predict that the next few years will witness many changes in the methods of operating a string of Park City's developed mines.

ELECTROLYTIC ZINC PLANT AT KELLOGG WILL EFFECT HIGH RECOVERIES OF METAL

Processes which, in connection with an electrolytic zinc plant to be built by the Bunker Hill Company at their Kellogg, Idaho plant, will effect recoveries in excess of 12 per cent higher than under present milling and smelting methods with Coeur d'Alene ores, are announced by Wallace G. Wolf, metallurgist.

Experiments with the new method, developed after several years of experimentation, show recoveries from Star ores of 92 per cent of the zinc, 95 per cent of the lead and 90 per cent of the silver.

F. W. Bradley, president of the Bunker Hill, promises that the electrolytic zinc plant will be built at Kellogg in time to handle the Star ores when the body is reached by the tunnel from the Hecla, within two years. He said that the ores of the Star alone would justify the building of the plant. It was estimated that a plant with a capacity for 50 tons of product daily would be needed, to cost between \$750,000 and \$1,000,000.

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*Illustrated.

THE ALL-ABSORBING TOPIC

Elsewhere in this impression is an article which epitomizes the magnitude of the Anaconda Copper Mining Company's operations in Montana and its status as a taxpayer in the commonwealth to the north. The information contained in the article is very incomplete, as the methods of taxing the great concern and the injustice practiced by the taxing powers of the state are not dwelt upon. It may be stated, however, that the Anaconda company's representative, quoted in the article, made it plain that unconscionable extravagance in the conduct of state business was proving a bane to the state and that a halt would have to be called if the state was to prosper in the future and become what it should be—one of the most important industrial, manufacturing and farming states in the Union.

All that was said about conditions in Montana applies with just as much importance to Utah, where the mining and farming interests are being taxed out of existence. Something has got to be done to trim the "overhead." Inconsequential reduction of clerks' salaries and similar expedients are not going to bring results, nor are they going to satisfy either the big or little taxpayers. The frills of government must be dispensed with and when the next session of the legislature convenes it will be up to those who are selected to represent the people who "pay the fiddler" to find a way of sweeping out many of the commissions, boards, bureaus, etc., that now call for huge maintenance sums of money. The mining industry, which is the chief

industry of the state, must be permitted to continue, for identically the same reason that makes it imperative in Montana.

Publications in every western state are discussing the "tax menace" from some angle, and with good excuse. Politicians will do well to read the handwriting. Here is the way the Arizona Mining Journal looks at the situation:

From almost every state in the west comes the plea of industry for tax reduction. Practically every western state is loaded with a political overhead which would not be justified by ten times the population.

Every public official denies all responsibility for the increased tax burden and says, "If the people vote these measures what can I do?"

Admitting without argument that the people are to blame for all the tax burdens under which they stagger at present, what is to be done about it? Obviously if the people are responsible for the tax increase it is up to the people to see that they get a tax reduction. When tax reduction is suggested the present beneficiaries of our tax system say it simply cannot be done, but the fact remains that it must be done.

Private industry has reduced expense all along the line to meet changed conditions and government must adjust itself to a more economical basis in the same manner as the individual and business has done.

The man who fights for tax reduction today is often held up to ridicule and calumny by those who prey off the present tax system and pay little or no share toward the burdens of government. The power of present political parties will be overthrown unless they join willingly in the campaign for tax reduction.

MINING DEAL SEASON AT HAND

With increasing frequency inquiries for metal mining properties—both developed mines and prospects—are reaching Salt Lake. Occasionally the Mining Review receives them; more frequently they come to mining engineers and others actively identified with the mining industry. It is becoming daily more certain that there is much money and many men ready to use it in the acquirement and development of legitimate mining undertakings whenever mine and prospect owners are in shape to properly present the propositions they are willing to make—and who may have properties to offer on reasonable, sane, business terms.

Under such favorable conditions as now exist it is pertinent to here suggest to property owners who are seeking financial assistance, or those who wish to dispose of meritorious mining properties, that they do certain things in advance of trying to interest capital:

First, be sure that your titles are good. You can not close a deal of any kind unless you are in a position to deliver the goods you have to offer.

Second, do not make claims with respect to the value of your ground that will not stand up under examination; underestimate rather than over-estimate.

Third, be prepared to accurately describe the boundaries of your property, with maps, drawings, photographs, etc., when possible.

Fourth, tell the exact truth about its location, district, distance from railroad transportation, water, timber, character of the ore, size and trend of the ledges, amount of development work done and its character.

Have all this information and as much more as you can give, prepared in a manner that will give a prospective investor a basis from which to figure and your chances of doing business will be immeasurably advanced.

You may have a property that you value at \$1,000, \$5,000, \$100,000 or more. The value makes little difference when it comes to selling or raising development funds. The real thing to be able to do is to "lay your cards on the table"—all of them—when you go before the investor with your proposition. You will be compelled to do it before you get through, so you might just as well get everything straightened out in the beginning. Attention to these matters will make it possible to close a deal in a month that would otherwise take a year. Think it over.

SOLUBILITY OF OIL SHALES IN SOLVENTS FOR PETROLEUM

By Martn J. Gavin (Oil-shale technologist, U. S. Bureau of Mines)
and John T. Aydelotte (Organic chemist, Colorado Oil-Shale Investi-
gation).

"Oil shale contains little or no oil as such, but it contains an organic material from which oil may be produced by destructive distillation." This statement, or others conveying the same meaning, appears in many popular and technical articles on oil shale. It is based on the belief that the ordinary solvents of petroleum have but little action on the organic substances contained in oil-yielding shales, although on distillation these same shales may yield upwards of 50 gallons of crude shale oil per ton. A 50-gallon shale thus yields by distillation 18.73 per cent of its weight as oil (assuming the specific gravity of the oil to be 0.900), although only a relatively small part of this can be recovered by extraction with such solvents as chloroform, carbon tetrachloride and the like.

In the course of certain experiments designed to determine the solubilities of different shales after they had begun to yield oil by distillation, it was found desirable to determine the quantity dissolved from certain unheated shales by various solvents, at or near the boiling points of these solvents. The

In physical appearance the extracts from all the shales were very similar. They were dark brown or black in color, and with the exception of that from the Ione, California, material, were of the natural hydrocarbons. The extract from the Ione material was waxy and practically fluid at room temperature (72°F.). Their volatilities were very low. They were not appreciably affected by cold concentrated sulphuric acid, were insoluble in cold alcohol and slightly soluble in hot alcohol. They were not attacked by cold nitric acid. Each had a faint odor much like that of the freshly broken shale from which the extract was made. The results of the experiments are presented in the accompanying table:

The first column shows the source of the shale; the second column shows the amount of oil produced from the shale by distillation in the Bureau of Mines type of assay retort, expressed in gallons per ton; the third column shows the amount of oil recovered by such distillation, expressed as a percentage by weight of the raw shale; the columns under the heading, "Extraction with solvent" show, first the percentage (by weight) of the shale extracted by the particular solvent, and second, the relative amount of extract produced, expressed as a percentage of the oil yield by destructive distillation.

Discussion of Results.

Disregarding the Ione, California, material, which is evi-

SOLUBILITIES OF OIL SHALES IN VARIOUS SOLVENTS FOR PETROLEUM

Source of Shale	Oil yield by distillation		EXTRACTION WITH SOLVENT					
	Gals. pr ton	Per-cent-age	By Carbon Tetrachloride		By Carbon Bisulphide		By Acetone	
			Per-cent soluble	Per cent of distillation yield	Per-cent soluble	Per cent of distillation yield	Per-cent soluble	Per cent of distillation yield
Kentucky	18.22	7.28	0.037	0.51	0.015	1.44	.....	.....
Soldier's Summit Utah.....	44.60	16.64	0.74	4.45	0.76	4.57	0.53	3.16
DeBeque, Colo.	35.75	13.24	2.04	15.42	1.85	13.97	1.33	10.04
Gree River, Wyo	58.65	22.67	1.195	5.27	1.27	5.58	1.22	5.35
Ione, Calif.*	52.00	19.65	7.555	33.46	5.83	29.68	10.98	55.80
			By Ether		By Benzol		By Chloroform	
Kentucky	18.22	7.28	.....	.....	0.06	0.82	0.14	1.99
Soldier's Summit Utah.....	44.60	16.64	0.745	4.48	0.91	5.47	1.05	6.32
DeBeque, Colo.	35.75	13.24	.....	.....	2.23	16.84	2.41	18.22
Green River, Wyo.	58.65	22.67	.....	.....	1.37	6.02	1.75	7.72
Ione, Calif.*	52.00	19.65	.....	.....	.....	.....	10.16	51.73

*Considered a lignite by most investigators.

method used and results obtained are presented below. These experiments were made in connection with the oil-shale investigations being conducted by the U. S. Bureau of Mines, in co-operation with the States of Colorado and Utah.

Experimental Procedure.

Five oil shales were used that are representative types from the districts in which they were collected, although not necessarily representative as regards richness. They may or may not be of greater richness than the average for the districts.

Each sample was ground to pass a 20-mesh screen, and all material that would pass a 60-mesh screen was rejected, as such fine material clogged the filter and made extraction very slow. Twenty grams of the ground sample were placed in a filter paper capsule in an apparatus of the Soxhlet type and extracted with the solvent in the usual manner with this type of apparatus. Extraction takes place at a temperature somewhat below the boiling point of the solvent. Extractions were continued for two hours after the refluxing solvent became clear. Then the solvent containing the extract was removed from the apparatus, and the solvent distilled off at as low a temperature as possible. The dish containing the extract was carefully heated to remove last traces of the solvent, dried in a dessicator, and weighed. In each case, results reported are based on two or more very closely agreeing tests. It should be noted that the percentage extracted is based on the weight extracted and not on the loss in weight of the shale.

dently a lignite, it will be noted than an appreciable amount of the organic constituents of the Utah, Colorado and Wyoming shales tested may be removed by certain of the more commonly used solvents of petroleum. In the case of the DeBeque, Colorado, shale the extract with chloroform amounts to 18.22 per cent of the weight of oil produced by destructive distillation. This shale appears to be more soluble in each of the solvents used than the other shales examined.

It is evident, therefore, that such solvents as were used in these experiments do have an appreciable action on the organic oil-yielding matter of oil shales. The Kentucky shale is by far the most resistant to the solvents used. The extract in all cases, however, is not what would ordinarily be termed oil and certainly, as is to be expected, it is not all like the oil produced by distillation of the shale. Nevertheless, until the nature of these extracts has been determined, it would be well to accept with reservation the belief that oil shales contain no oil as such. The writers do not believe that the extracted materials are oils, in the common meaning of the word, but certainly the extracted material is much like certain of the natural hydrocarbons, supposed by many to have been formed from petroleum by oxidization, etc. A careful study of such extracts might be of considerable value in determining the origin of oil shales.

It is to be noted that the solubility of a shale is not an index of its relative oil yield. The shale that was most soluble in all the solvents was the Colorado shale, yet both the Utah

and Wyoming shales yielded oil on distillation at a higher rate.

Some authorities have expressed the belief that American oil shales are not true oil shales because of their relatively high degree of solubility. If solubility determines whether an oil-yielding material is a true oil shale, certainly the Scotch oil shales were misnamed. According to Steuart,* Broxburn shale is soluble in various solvents as follows: Ether, 1.66 per cent; carbon bisulphide, 2.04 per cent; shale gasoline, 1.79 per cent, and a mixture of equal parts of ether and shale gasoline, 1.95 per cent. A Soxhlet apparatus was used for these tests.

Steuart further states that the extracts, when freed from the solvents, were in general much like native petroleum. It is pointed out that a solubility of 2 per cent means an extraction of 40 pounds to the ton, roughly equivalent to 5 gallons. Therefore, if the shale discussed by Steuart yielded as much as 40 gallons by distillation—which is not likely—then the equivalent of 12½ per cent of the oil yield was soluble in carbon bisulphide.

PRODUCTION OF LIME IN 1921

About 2,531,000 short tons of lime, valued at \$24,536,000, was sold in the United States, including Hawaii and Porto Rico, in 1921, according to an estimate made by the United States Geological Survey, Department of the Interior, from reports made by the principal producers. This quantity is less than that sold in any year since the Survey has collected its statistics and is 29 per cent less than that sold in 1920. The average value per ton in 1921 is estimated at \$9.69. In 1920 it was \$10.52, and in 1919 it was \$8.84. Of the 42 States and Territories that produced lime in 1921, 5 increased and 27 decreased their output as compared with 1920. The five States that increased their output in 1921 made only small gains and were affected by local or special conditions, such as contracts made late in 1920.

The sales of hydrated lime in the United States in 1921 were estimated at 737,000 short tons, a decrease of less than 14 per cent as compared with those in 1920, whereas the sales of quicklime (including refractory lime or dead-burned dolomite) were estimated at 34 per cent less than in 1920. Of the 30 States that reported an output of hydrated lime in 1921 only 7 showed an increase in production. The estimated value of the hydrated lime sold in 1921 was \$7,673,000, an average value per ton of \$10.41. The average value per ton in 1920 was \$10.89.

Economic Conditions

Reports showed that fewer plants were in operation in 1921 than in 1920, and some firms that intended to start work either abandoned their intentions or held them in abeyance. Many small kilns on farms were not operated on account of the high price of coal. Firms that actively operated plants for many years closed them down in 1921 because they could see no profit in the business. A few new plants were put in operation, although many of the old ones were active during only a part of the year. There was less complaint of shortage of labor in 1921 than for several years past. The high price of coal was still a drawback to the industry, but the cost of production was generally reported to be less than in 1920. High freight rates affected the production of lime to a great extent by closing markets to firms whose output could not all be taken in the local market and by raising the gross price so high

that the potential consumer could not afford to pay it. The lime market was very poor and irregular until fall, when the demand apparently increased but was still below normal.

Prices were unstable during the year but on the whole decreased throughout the country. In one locality the average price of quicklime per ton from January to June was \$9.80 and from July through November \$7.30. The average price of hydrated lime per ton in the same locality was reported at \$12.30 from January to June and \$9.80 from July through November.

Construction Lime

Though a few producers reported that the demand for construction lime in 1921 was equal to or greater than in 1920, by far the larger number reported a much smaller demand and a decrease of output of 20 to 75 per cent. The total output of construction lime undoubtedly decreased in 1921, but that of chemical lime and agricultural lime decreased as much if not more. The output of Ohio, the State that produces the largest quantity of building lime (60 per cent of the total), decreased only 10.5 per cent in 1921, whereas that of Pennsylvania, 80 per cent of whose output is sold as chemical and agricultural lime, decreased nearly 40 per cent. This large decrease reduced Pennsylvania for the first time to second place among the lime-producing States. In spite of adverse conditions a certain amount of construction work is always carried on throughout the country, and if the rates of transportation are lowered this branch of the industry will surely regain its pre-war position.

Chemical Lime and Agricultural Lime

The reports received indicate a very large decrease in the output of chemical lime in 1921, due to the decline and depression in the metallurgical and chemical industries. The production of dead-burned dolomite, which has replaced calcined magnesite for use in patching and lining basic open-hearth furnaces, decreased from 316,000 tons in 1920 to 140,000 tons in 1921. Decreases of 25 to 65 per cent were reported for the plants that produce dead-burned dolomite. Decreases were also reported by plants that manufacture lime for use by paper mills, sugar factories, alkali works, carbide plants, and other chemical industries.

A few producers reported increased sales of lime intended for use as fertilizer. Others reported decreases of 20 per cent to 90 per cent. Some producers reported that farmers were buying more lime because of the high price of other fertilizers. Others, however, reported that farmers were not buying but were waiting for a decrease in freight rates that would lower prices. Practically all producers reported that prices of lime at the kilns were lower in 1921 than in 1920.

In referring to conditions in England back in 1830, Lord Macaulay told some truths which are quite as applicable today as then, says the Old National Bank of Grand Rapids, Mich. The great Englishman said: "Our rulers will best promote the improvement of the nation by strictly confining themselves to their own legitimate duties, by leaving capital to find its most lucrative course, commodities their fair price, industry and intelligence their natural reward, idleness and folly their natural punishment, by preserving peace, by protecting property, by diminishing the price of law, and by observing economy in every department of the state."

The good old parlor game of "find the thimble" is nothing compared with congress' new diversion of finding the money for the soldiers' bonus.—Exchange.

*Steuart, D. R., *Oil Shales of the Lothians, Part III, the Chemistry of the oil shales; Memoirs Geo. Survey, Scotland, 2d. ed., 1912, p. 759.*

DIAMOND DRILLING CAMPAIGN IS PROVING UP OATMAN GOLD MINES

By James F. O'Brien

Oatman, Ariz., Feb. 25.—A diamond drilling campaign, the extent of which has probably never before been equalled in a mining camp, is now in progress in the Oatman district. Not less than six companies are prospecting various portions of their ground by this low-cost method, seven others have definitely announced that they will be drilling within thirty days, and at least a dozen more are making plans to resume active operations and enter the race for gold.

This increased activity is occasioned principally by the sensational results secured by diamond drilling in the Oatman United mine, but the much better showings of high-grade ore in the United American, Telluride and other mines, as well as what looks like a definite turn of the investing public to gold mining, are also having much influence. A further influence is a keener realization of the fact that three mines—within a radius of a mile of the Tom Reed, Gold Roads and United Eastern—have produced approximately \$28,000,000 in gold in a comparatively few years.

As the news of the extent and values of the ore in the Oatman United, found by assaying the drill cores, began to circulate among mining men on the outside, it was received by many with skepticism. One remarked that "someone must have taken the bull by the tail instead of by the horns." Even local residents who have stuck with confidence to the camp during the lean as well as the flush days did not at first fully awake to the certain value and immense possibilities resulting from the Oatman United development.

But it may be believed that they are awake now, and every loose dollar in the camp has been invested in mining development or mining stocks. When the owners of the Merry Widow started to raise funds for a diamond drill campaign on their property, the entire allotment of stock for this purpose was sold in a single afternoon in the town of Oatman. Such evidence of confidence and sincerity by the working miners that know the camp should remove any lingering doubt as to the genuineness of recent ore finds.

Big Rhyolitic Dike Gold-Bearing

The strong feature of the Oatman United strike is the finding of the ore in and against the big rhyolitic dike. Heretofore the ores of the Oatman district were found along fractures in the andesite, and not associated with the rhyolite. Now immense possibilities for large bodies of ore are foreseen by the discovery of high values in and against the rhyolitic dikes themselves. These dikes are of tremendous width and where such good values are found clear across them, the truth of the foregoing is apparent.

In the past, though it has been conceded that the rhyolitic dikes were the genesis of the ore occurrences, the commercial orebodies have always been found in fractures lying some distance from these dikes. The new discovery does not antagonize the theory as to the genesis of the ore, but adds the intensely interesting feature of high-grade ore against and in the dikes themselves.

Through the whole Oatman district there runs a consistent and massive dike of rhyolite. It can be seen outcropping prominently along the hills for many miles. It is this dike, or series of dikes, in which has now been opened up entirely new phases looking toward a wonderful future

for the district. If the experiences at the Oatman United can be repeated at intervals along this intrusion—and conservative mining men believe they will be—Oatman is likely to become a producer of gold beyond the expectations of the most sanguine.

Disclosures of Diamond Drilling

The diamond drilling at the Oatman United was first started at a point 1800 feet southeast of the station on the 600-foot level. In all eighteen holes, pointed at different angles—up, down and laterally—have been drilled as this is written. A quartz vein was found by a sufficient number of these holes to definitely prove it for a length of 600 feet, and to a depth of 538 feet, with an average width of four feet as indicated by present developments. That the foregoing figures do not represent the full size of the orebody is shown by the fact that faces of the drill holes, both up and down and along the strike of the vein, were all in ore when they were discontinued. An average of all the assays from this orebody shows that it will run about \$20 per ton in gold.

While not sensational, such an orebody would be considered quite satisfactory in almost any mine. But, as Superintendent Harvey N. Hammond acknowledges, "it looks like the quartz vein in the Oatman United is just a side issue." It is in the rhyolitic dike against which the quartz vein lays that the unexpected and sensationally large and valuable orebodies have been found. In regard to these latter Mr. Hammond hesitates to give exact figures, especially since there has been some exaggeration by others of the admittedly big showing. As he remarked, "It's big enough as it actually is"—exaggeration defeats its own end.

Ore Body 600 Feet Long

As before stated, the orebody of the quartz vein has been definitely determined to be at least 600 feet in length and 538 feet in depth. But the orebodies in the rhyolitic dike are not as definitely determined. It is expected that the results of the next few days' drilling, together with what has already been done, will give a much better idea of the magnitude of the showing in the rhyolitic dike, after which it is likely that the company will give out a detailed announcement.

Without attempting to anticipate this official announcement, and repeating only what has been definitely confirmed, the following will give an idea of what may be expected when actual ore production from this rhyolitic dike is under way. One drill core shows an average value of \$124 in gold per ton across thirteen feet. As big as that is, it probably means much less in actual worth than another core which shows average values of \$12 per ton across 70 feet. This was so unexpected that the accuracy of the assay was doubted, and it was checked a number of times by several assayers before it was given out.

Rumors, apparently well based, of even greater widths of pay ore, and high-grade ore in sizable bodies, have been circulated, but the management believes that the above facts should suffice for the present. There is going to be a whole lot of good ore, that's sure.

The showing in the United American and the Telluride would occasion much more excitement were they not overshadowed for the time being by the more sensational Oatman United. Both of these properties are producing high-grade ore running from \$35 to more than \$100 per ton, and before the month is out the Tom Reed mill will begin on

its contract to treat a minimum of 25 tons per day from each property.

United American, Telluride and Others

The United American, of which Wm. K. Ridenour is manager, is producing ore from the stope above the 700-foot level in which free gold, visible to the naked eye, is plentiful. The orebody now being stoped is proved for 80 feet in length on the 700, and is expected to mill an average of between \$50 and \$60 per ton for a width of four feet. It is opened up for a length of 225 feet on the 500 level and for 150 feet on the 850 level.

The ore in the Telluride mine is not quite as rich as in the United American, but it is unusually high grade to put through a mill. As it is broken and shipped it is planned to keep it down to a grade of \$40 a ton, or a little less. The claims of the Telluride are so situated that every one of the known vein systems of the Oatman district must inevitably go through one or the other of them if they continue on their present strike. J. L. McIver, who with Geo. W. Long opened up the United Eastern and put Oatman on the map, is president of the Telluride company and Bob Lyons is superintendent.

The Big Jim Consolidated, controlled by Teter & Co., of Los Angeles, and managed by A. G. Keating—the men who developed the original Big Jim in which millions are blocked out—had a diamond drill outfit shipped by express and are now at work at the juncture of their vein with the rhyolite dike in which the Oatman United found their big mine. It is believed they are in line for another winning.

Sheriff Mahoney and Senator Curtin were in camp the first of the week superintending operations on the Oatman Combination, in which they are interested and which is one of the most promising prospects.

The Silver Creek Bonanza, with J. J. McCarthy in charge, has two good oreshoots exposed on the surface and the bottom of a 30-foot shaft is all in pay ore.

The Argo is another of the most promising properties now in active operation on which it is planned to soon commence diamond drilling. S. S. Jones is president and J. Shanks is secretary of the Argo.

Among other companies not previously mentioned that have announced drilling campaigns are: The San Francisco, Nellie, Lexington, Lucky Boy and Baltic. The showing and location of these is believed to warrant the high hopes of those in control.

PROVING UP DEEP OIL SANDS OF SALT CREEK FIELD, WYOMING

The fact that oil was encountered in several of the lower horizons in the Salt Creek field in a deep test well drilled last summer by the Midwest Ref. Co. on sec. 25-40-79, has been confirmed in official quarters as a result of a renewal of a controversy regarding a test put down to the third Wall Creek sand in the winter of 1917-18 by the E. T. Williams Oil Co. on the se $\frac{1}{4}$ of 11-39-79. Reference was made to the Williams test in Wyoming Oil News on Jan. 21 in connection with an announcement that the Ohio Oil Co. was also drilling to the deep sands on the sw $\frac{1}{4}$ of 1-39-79, and this brought forth denials that the Williams well had ever reached the third sand.

Salt Creek's production originally came exclusively from the first wall Creek sand encountered around 1,000 to 1,200 feet. In the spring of 1917 E. T. Williams prevailed upon the Midwest officials to permit him to make a test to the second sand. His theory was that the first sand was a true water sand and that the presence of oil in it

was due to the pressure of oil from a lower formation forcing the water out on the flanks of the structure. C. A. Fisher, consulting geologist for the Midwest, selected the se $\frac{1}{4}$ of sec. 11 for the Williams test on the theory that if water was to be found in the second sand that it would be encountered at that location. Midwest turned a 40-acre patented tract over to Williams and the company bearing his name was formed and drilled No. 1 which came in as a producer in the second sand on Aug. 24, 1917. This was the first conclusive test to the second sand and was a very important discovery. This formation has since become the principal producing horizon for the field and greatly enlarged the producing area.

Williams then reasoned that he had not yet reached the real source of the production in the field and decided to put down a test to the third sand. He argued that the tests of the different oils proved his theory, the shale oil testing 40 to 41 gravity, the oil from the first sand 39 gravity and the oil from the second sand in his No. 1 testing 37 gravity, indicating that the crude was being filtered as it migrated from another source. No. 3 was started as a deep test and on Jan. 21, 1918, its completion in the third sand at 3,200 feet was announced. Owing to the oil in the hole from the second sand interfering with operations, it was difficult to determine the results though it was evident that what was believed to be the third sand contained oil. The well was shot and was then estimated good for 30 or 40 barrels and proved to be a disappointment.

Williams contended that it was in the third sand but associates disputed this and were sustained by Fisher who expressed doubt about the third sand having been encountered. Mr. Fisher now says that the opinion he then held has since been strengthened by the drilling on sec. 25, in which they did find lower sands and also found that these sands were productive. He states that Salt Creek, like other fields, has sands that are thinner in some parts than in others and in some parts more solid with shale in them and that, therefore, the Williams test is not conclusive as to the field even if the third sand was not found in place at that location. The better location for a test is near the top of the structure where a better development may be expected. He says there is every evidence that the third sand is in place in the field and that another test is desirable and will be drilled.

In the Midwest test on sec. 25 oil was found in several horizons and also water, but the oil and water are coming from different horizons and the shutting off of the water is strictly a mechanical problem. All the oil in the hole below the second sand is not coming from the Lakota sand and the fact that others are ready and willing to expend money in further tests show that further tests of the lower horizons are fully warranted by results so far obtained.

"The late Champ Clark," said a Chicagoan, "was an out-and-out American. He hated all kinds of affectations and fads. He wouldn't let you call a sitting room a living room, or a silk hat a topper, or a shoe store a boot shop. Get what I mean? I ran across Champ Clark one Sunday afternoon on the board walk of Atlantic City. 'Hullo, boy, what you doin' down here?' he asked me in his hearty way. 'I'm down here for my week-end,' said I. Champ gave a sneer. 'Oh,' he said, 'something wrong with you head, eh,'"—The Argonaut.

Ford is said to be experimenting with pasteboard automobile bodies. "Bring the paste-pot and scissors, George. We've had a smash-up."

Around the State

The roads into the Alta and Big Cottonwood districts are open again and ore shipments from the Alta Tunnel, Michigan-Utah and other properties have been resumed.

Castle Gate has been working full six days lately. Also at the Kinney at Scofield. Clear Creek and Winter Quarters four and five days. Standard Coal and other Spring Canyon mines are going all close to six days, according to late coal camp reports.

George Nichols of American Fork has brought suit against the Lehi-Tintic Mining Co. of that district. Plaintiff seeks to have the defendant company republish a delinquent stock sale notice. Mr. Nichols, who during the past few months has been in litigation with this company on a number of propositions, is a former manager of the Lehi-Tintic.

Beaver Copper Company will resume work at its mining property in Beaver county on March 1, according to a statement issued to stockholders which accompanies the notice of the current assessment of one-half cent a share. According to the statement no work was done at the property during 1921 with the exception of some mine timbering and providing a fuel supply.

Site for a steel plant together with needed water supply has been subscribed by Delta to the Utah Steel Company as an inducement for that company to build a steel plant at Delta. A committee of business men was appointed to present the offer to the steel company. A communication signed by the Delta Commercial club, Merville Irrigation Company and Deseret Irrigation Company, who jointed in subscribing the land and water, was sent to the steel company.

According to reports from the Park Utah new ore finds are being made as development progresses, and that far greater quantities of shipping ore is being mined than is being shipped—despite the fact that on an average of fifty tons a day is being shipped by way of Heber, besides the large tonnage that is shipped by way of Park City. Preparatory work continues for the electrification of the Ontario drain tunnel, through which the Park Utah is being worked.

A special meeting of Silver Shield Mining and Milling Company stockholders is called for March 4 to vote on a proposition to increase the capital stock of the corporation and change the name of the company. The proposed new name for the company is "Park Utah Extension Mining Company." The capital stock of the company at present is 300,000 shares and it is proposed to increase this to 2,000,000 shares, the new stock to be placed in the treasury for the purpose of acquiring new property, said to be the Avondale.

O. E. Anderson of Anderson's garage, Provo, has just returned from a trip to Wild-cat mountain, 100 miles west of Salt Lake, where he is interested in a property being developed by the Fluride Mining Company. Mr. Anderson gives a glowing report of the mine and declares that at a depth of 50 feet this company has developed ore, carrying silver and copper values as high as \$112 per ton. One

shipment, he said, netted the company \$48.06 per ton. This is a comparatively new property, located about 20 miles from the old Utah mine which has a production record of several millions of dollars.

After sinking to a depth of about thirty feet below this point the work of cutting a station at a depth of 1200 feet has been taken up at the property of the Zuma Mining Company in the eastern end of the Tintic district. Sinking operations have been in progress at this property for several months past but as soon as the station is finished the development of a big vein, recently cut by the shaft, will be taken up. The showing in the shaft causes the officers of the company to believe that a systematic prospecting of the ground on the 1200 level will result in bringing the Zuma into the productive stage.

Wages at the mines of Tintic are to be put back where they were prior to the 50 cent reduction made on January 16th. Such news was given on Tuesday of this week, first by the local office of the Eagle & Blue Bell and Victoria, where the men had been out on strike for four or five days, and later by the other properties. The Tintic Standard men, who had asked for an increase, but who had remained at work, were also notified that the higher scale would be put into effect without delay and it is generally understood that other properties in this district have taken or will take similar action.—Eureka Reporter.

Following the annual meeting of stockholders of the Michigan-Utah Consolidated Mines Company recently held the following officers were elected: President, J. R. Van Evera; vice president, Robert A. Crown; secretary and general manager, N. I. Robertson; treasurer, Frank B. Cook. These, with W. J. Halloran, Duncan MacVichie and W. J. Davis, make up the directorate. Manager Robertson reported that physical conditions at the mine had so improved during the past year that indications now are that there should be considerable profits coming in from ore shipments. He stated that the company was entirely out of debt.

Jack May, who on February 1st resigned his position as superintendent of the Tintic Standard mine, has commenced leasing operations at the Grand Central mine at Mammoth. The Grand Central, recently taken over by the Chief Cons. Company, is being operated throughout under the leasing system and Mr. May, it is understood, will take charge of the deep mining although he has other leases. The lowest main level in the Grand Central has a depth of 2300 feet and there is a winze which opened some ore 60 feet below the 2300 level. For a time this winze contained a considerable amount of water but recently the water has been receding in this, as well as other Tintic mines, hence there is nothing to interfere with deep mining in the Grand Central. Mr. May has recruited his force and will operate on a rather extensive scale.—Eureka Reporter.

Fred Corkill, age 65 years, for many years foreman of the Northern Belle Mining Company at Candelaria, Nevada, died Monday, the 13th, at Oakland. He had been mining field engineer for "Borax" Smith for the last 25 years, and was well known in this state. He is survived by a son, Fred Corkill, Jr., superintendent of the borax mill at Death Valley Junction, and a married daughter who resides in Oakland. His wife died about two years ago.

In Nearby States

ARIZONA

R. L. Johns, Nevada operator and president of the Oatman Combination Mining Co. recently visited the camp and proposes to install a diamond drill to prospect that property, which is favorably located.

At present about seven hundred and fifty men are employed at the several mining properties, smelter and mill of the Greene Cananea Copper Company. They are spending about one million dollars on much-needed improvements.

Arrangements are being made for power at the mines of the Combination mines, at Oatman, so that everything will be soon in ship-shape to start the new work. The plant of machinery at the mine will also be overhauled, tanks installed and everything possible made ready for the work of diamond drilling.

Four assays taken on as many days across a width of 5 feet in the stope above the 700-foot level in the United American mine at Oatman gave the following average returns: \$43, \$67.80, \$80.20 and \$668.05 gold per ton. W. K. Ridenour, general manager, states that the ore in this stope has a general average value of from \$50 to \$100 gold a ton.

The difficulty experienced of late in sinking the Gold Chain shaft in the Katherine district, due to a flow of water, has been overcome by the installation of a No. 6 Cameron pump. The water came in at a depth of 165 feet in the shaft and with its further deepening the flow increased very materially. Sinking now has been resumed, however, and will continue to a depth of 300 feet.

M. B. Dudley recently concluded arrangements for the taking over of the old Casey Jones property at Oatman and it is to be incorporated under the name of the Oatman Hill Top. This property is one of the important ones of the district, having had a large amount of work done on it during the past several years, and having a large vein system. It is purposed that work be commenced on the mines within a short time.

John Hays Hammond, the well known mining engineer of New York, is reported to be experimenting with the ores of the 3-R mine in the Patagonia district, Santa Cruz county, in an endeavor to find a new method of treating it. If the new method is successful, which it is claimed it is, Mr. Hammond may purchase a controlling interest in the property, form a stock company and start operations there on a large scale. The 3-R has been owned by the Magna Copper Company for some time, it having been purchased from Col. R. R. Richardson, of Patagonia, who still has an interest in the property.

BRITISH COLUMBIA

Gold from his placer ground on Quesnel river in the Cariboo mining district is being shown by William J. Marquardt, of Spokane, Wash. He expects to return in eight or nine weeks in the spring to clean up between \$5,000 and \$10,000.

The Silversmith mines produced 400 tons of silver-lead concentrates in January, according to John B. White,

of Spokane, Wash., president, on his return from the property at Sandon, recently. This was in addition to 50 tons of concentrates used in bedding the mill. Shipments aggregate 500 tons of crude and concentrated ores, made to the Bunker Hill smelter.

The Bayonne Gold mines, operating on Summit Creek, 26 miles from Kootenay Landing, has cut the vein on the No. 3 level and is drifting toward a point under the ore shoot on the No. 2 level, believed to be 250 feet ahead. This body has been opened for 450 feet on the No. 2 level, where it is three to 20 feet wide and contains an average of \$20 in gold to the ton. At a point 250 feet ahead the drift will attain a depth of 700 feet on the No. 3 level.

COLORADO

Lessees of the recently organized Cripple Creek Gold Bond Mining Company, operating at the 200-foot level of the Hammer shaft, on the southwestern slope of Gold Hill, have entered a rich ore shoot, and are saving screenings sampling around seven ounces gold to the ton.

A deal was successfully closed a few days ago by which William Morgan, pioneer prospector and mine operator of Idaho Springs disposed of his Brazil group of 16 lode mining claims, located near the head of Trail Creek, to a Long Beach, California syndicate. The consideration has not been made public, but it is generally known that Mr. Morgan received a substantial cash payment, on account when the papers were filed.

IDAHO

Eugene R. Day, manager and one of the chief partners in the Hercules mine at Wallace, and holder of large mining and smelting interests elsewhere, died at Spokane, Wash., February 11, after a long illness.

Lessees of the Sidney mine on Pine creek are shipping steadily from the shoot struck recently, according to reports at hand. For the last 30 days they have hauled 10 tons daily to the Bunker Hill smelter. The ore contains lead and silver.

The Bunker Hill smelter has refunded nearly \$6,000 to shippers of ore from British Columbia last year, according to Frank M. Smith, smelter director, with offices in the Paulsen building, Spokane, Wash. The refund was of duty paid on lead and was made possible by the export of the metal to France.

Another carload of ore has been shipped by the leasers of the Western Union mine in the Coeur d'Alene recently. They plan to ship two cars weekly. This is the property on which a rich strike was recently reported. The company gets 25 per cent royalty on all smelter returns on ore shipped by leasers.

A new mining company has been formed to work the Katherine group of claims on Blacktail mountain. The property is near the Armstead and Silver properties and its lead is thought to be a continuation of the Silver Hill vein. It is owned by F. O. Berg, Helmer Foss and George Hines. Berg, a half owner, was the former owner of the Imperial group, now the Armstead mine, at Talache.

Officers and directors of the Idaho-Northern Mining Company were elected at the annual meeting held at Spokane, Wash., recently. The property is in the Summit district of the Coeur d'Alenes. John A. Sangren of Spokane

is president. Other directors are: O. M. Nordquist, vice president and manager, Wallace; Walter Keister, Murray, secretary treasurer; O. F. Nordquist, Wallace; Fred Williams, Coeur d'Alene and Andrew Engquist, Spokane.

Greater depth in the workings of the Bunker Hill & Sullivan mines at Kellogg was recently rewarded by entering a new vein system known as the Jersey, on a level 1600 feet below the Kellogg tunnel, according to reports received at Spokane, Wash. These findings are considered ample assurance that the great Bunker Hill ore body will be found in all its massive richness when reached by the crosscut on the 1600-foot level.

Engineers from New York will be in the Coeur d'Alenes in a few weeks to report on the Independence Lead mine, before installing machinery to secure more rapid development, according to H. B. Kingsbury of Wallace, while in Spokane, recently. "I learned on reaching Spokane that the strike on our ground in the You Like vein, which crosses the Independence, is important, showing 20 feet of concentrating ore and two feet of fairly high-grade ore," said Mr. Kingsbury. "We also have the Morning vein crossing our ground lengthwise. The Independence lies between the Morning and the Hunter mines." Mr. Kingsbury and associates control 950,000 shares of the total 1,300,000 shares of the Independence stock.

The suit by Day-Smith interests, minority stockholders in the Hecla Mining Company, to secure the cancellation of the Hecla Bunker Hill contract involving joint operation of the Star mine resulted in a sweeping legal victory for the Hecla company after litigation lasting more than three weeks and involving an expenditure during the hearings of more than \$200,000. With the costs of the preparation of the case on both sides the case is said to have been the most expensive in the history of the Pacific northwest. The superior court held for the Hecla company on every point involved in the action, and the judgment is regarded as the most complete and clean-cut ever handed down in mining litigation here. Plaintiffs have taken an appeal on the point of "ultra vires." Immediately following the decision a shareholders meeting of the Hecla company ratified the directors' action in purchasing a half interest in the Star mine.

NEVADA

The following shipments were sent forward to Salt Lake smelters from Pioche during the week ending on the 17th. Black Metals Mine, 285 tons; Bristol Silver Mines, 110 tons; Dewitt Cunningham lease, 40 tons; Clark lease, 35 tons, a total of 470 tons.

A shipment of three tons of high-grade ore from the Miner-Camp lease at Royston which was treated at the MacNamara mill gave returns of 234 ounces per ton in silver and \$4 in gold. The lead content was not recovered and was not taken into account in settlement.

Information from W. J. Tobin, general manager of the Consolidated Mayflower also of the Reorganized Pioneer at Pioneer, is in effect that recently a gold retort from the mill was shipped to the mint. It weighed 121 ounces. Another is expected to go out this month. The latter will be the result of the mill run during latter part of January and first week of February.

Two carloads of machinery, including hoist, com-

pressor shaft timbers, etc., were received this week by the Oest Mining Co. at the Silver City switch, and the consignment was unloaded just ahead of the storm. As soon as the conditions will permit, work will be started by Superintendent Ed. Klaus installing the machinery and repairing the shaft.

Announcement has been made by W. O. Woodbury of Reno, president of the Buckeye Cons. Mining Co., and by W. J. Loring at San Francisco, president of the Silver Hills Nevada Mines Co., that the Buckeye mine has been acquired by the Silver Hills Company. Woodbury states that the purchase price is \$65,000, of which \$40,000 is to be paid in cash, the balance in monthly payments of \$4000.

After serious delays, occasioned by the severe weather and consequent machinery breakdowns, the power plant at the Bristol Silver mines is again in operation, though a number of minor defects have yet to be remedied. The new cable for the tramway connecting the mine bins with the railroad terminal at Jack-rabbit is now in place and the tramway has been in active operation since the 10th.

Sinking of the 320-foot incline shaft on the property of the Hudson Mining Company at Royston is now well under way. Ground will probably be broken at the rate of from three to four feet each day. This piece of mining engineering will go a long way toward proving up the persistency of the ore shoots in the Royston district and the results will be watched with a great deal of interest by those having the future of the silver camp at heart.

Jules V. Barnd, president of the Consolidated Spanish Belt Silver Mines Co., located near Manhattan, Nye county, came all the way from the eastern office of the company at Toledo, Ohio, to help the boys get the snow cleared off the road so that supplies could be delivered at the mine and operations resumed. Barnd started from Tonopah for the mine with Foreman Mike Lamb and got within five miles of his goal when the deep drifts forced the two men to turn back. It will not be possible to start work again for several weeks, according to present indications.

Another company has secured claims in the Comstock district. This time it is the Alladin Divide Mining Company of which C. N. Miller is the president. Mr. Miller for the Alladin Divide has secured control of the Alladin-Comstock Mines Company which owns four patented claims on the Brunswick lode in the Comstock district. The claims include the Victoria, Sunrise, Morning Star and Dexter which lay close to the old Monte Cristo mine which was a famous producer years ago. The Monte Cristo is credited with a production of \$1,800,000.00.

Bert Goldsworthy, who is operating a lease with L. K. Kramer on the latter's property in the Iron Point district, is spending a few days in the city with his family, who reside here. Mr. Goldsworthy states that they have a carload shipment of rich ore ready to be sent out to a smelter, but are unable to get it away because of the deep snow in the camp. The lease has been under operation all winter and the ore bodies are showing up fine at the present time. The ore values are mostly in silver, contained in bromides, chlorides and hornsilver. Samples of the ore shown here are extremely rich in the white metal.—Humboldt Star.

WASHINGTON

Following the completion of the first two units of a \$100,000 magnesite manufacturing finishing plant near Valley, 50 miles north of Spokane, by April 1, the American Mineral Products Company will begin active operation on a large scale, according to H. L. Grizzell, superintendent.

"The Ruby Mining Company expects to start milling operations in the near future," said A. L. Goodell, metallurgist, on his return from the mine at Oroville to Spokane recently. "Much development work has been done and a carload of crude ore, shipped to the Bunker Hill smelter recently, contained \$100 in silver to the ton."

Owing to numerous orders for immediate delivery of marble chips for terrazzo flooring, the Washington Marble Products Company has been obliged to start the small plant at Chewelah, Stevens county, formerly operated by the Chewelah Marble Company. This will not interfere with the erection of the new and modern plant which the company had hoped to complete before the demand became too urgent.

A new tunnel is being driven in the property of the Admiral Mining Company, near Valley, to give 300 feet additional depth below the copper ore found there last summer. The work is being done at the rate of five feet daily, under direction of H. E. Firth, vice-president and superintendent. Arthur Hooper of Spokane is president, J. V. Campbell secretary. The company is one of the few Stevens county concerns which operated all last year.

Petroleum Notes

The first course in petroleum engineering in Japan has been established by a mining college.

A. C. Morrison of Salt Lake City, representing the United States Royalty Co., has been in Casper for several days conducting negotiations for the purchase of holdings at Salt Creek and in other Wyoming fields for his company.—Inland Oil Index.

A plant for the manufacture of carbon black from natural gas will be erected in the White River country, about 20 miles west of Meeker, Colorado, this spring, is the latest report, and that plans have been formed for the erection of two or three other plants of the same nature.

Reorganization of the Rio Blanco Oil Company as the American Carbon Company was effected in Grand Junction, Colorado, recently. The company is reported to have a flow of 30 million cubic feet of gas from the depth of 800 feet coming from three wells on the White River structure, and that capital for construction of a carbon black plant is assured.

The Midwest Refining Co. has plans under way for the construction of another large gas compression plant in Salt Creek to be known as No. 3 and, when completed, the combined units will make it the largest casinghead gasoline compression plant in the world. Preliminary work on No. 3 is now under way and when the plant is ready

for operation a second gasoline pipe line from the field to Casper is to be laid.—Wyoming Oil World.

Final and official figures on production of crude oil from lands owned by the state of Wyoming in 1921, show a total output of 4,154,961 barrels, the highest on record. The royalties received by the state on this production during the year amounted to \$1,519,043. Gas production from state leases amounted to 1,164,731,499 cubic feet. The approximate value of this gas was \$59,878.

Oil has been found in Picabo and surrounding country in six different wells; it stands on the top of the water and in one case it is as thick as a knife blade, rendering the water unfit for use. The oil is in the following wells: H. C. White, Froehlich Bros., Bertram Bros., A. L. Womach, Picabo Garage, and L. A. Lambert. The O. S. L. men are here digging a new well for their railroad tank and report they find oil on the water. The air pockets in the ice on Kilpatrick Bros. ice pond is filled with gas and will ignite when a lighted match is held close to it and burn like a gas jet.—Hailey, Ida., News-Miner.

Personal Mention

D. J. Roberts of the A. S. & R. Co., at El Paso, was recently in the Miami district looking into ore shipping prospects of that section.

R. I. Green has recently joined the staff of field representatives of the American Smelting & Refining Co.

L. F. Rains and Capt. Duncan MacVichie have gone to the coast on business connected with the mammoth steel-coal organization which promises to cut loose in Utah this spring.

Ethelbert Shores, of the Stimpson Equipment Co., returned last week from a business trip into Arizona and Nevada. He states that the mining business is rapidly picking up in Arizona and that Nevada, also, is beginning to shake off its lethargy.

W. H. Bachman, secretary of the Card Iron Works Co., of Denver, returned to headquarters last week after spending several days in Salt Lake on company business. The Card Iron Works design and manufactures mine cars, trucks, tippie equipment, etc. Mr. Bachman says business is picking up.

H. A. Major, who for some time has been superintendent of the Spanish Fork factory of the Utah-Idaho Sugar Co., has taken a position with the Chief Consolidated Company. His work will be to superintend the mining and marketing of lime rock at the Chief's new quarry.

Charles C. Backes, who has been secretary-manager of the Intermountain Automotive Trades Association, joins the staff of the Utah Oil Refining Co. tomorrow as assistant sales manager.

The Hercules Powder Co. has again reduced prices on high explosives, permissibles and "B" blasting powders. New prices became effective on the 17th and will be quoted by company representatives on request.

Reciprocity with Canada seems to mean an allowance for returned bottles.—Wall Street Journal.

UTACAL OIL TRUST REACHES OIL SANDS

The Utacal Oil Trust of Salt Lake City, headed by E. J. Shields, have reached the oil sands at their Huntington Beach holdings, Calif., the well having attained a depth of 2606 feet and is cased to that depth by an eight inch pipe. The well has been cemented as required by the California law and will remain so cemented for at least two weeks before the well can be completed into the oil producing sand. One Miley Oil Company well, not 300 feet away, is producing 1,800 bbls. per day at present.

The company is expecting at least a 1,000-barrel well with 22.4 gravity oil, which is worth \$1.35 per barrel at the well. Tanks have been erected and contract let with the Standard Oil Company for the production.

Walter H. Dayton is president, H. G. Sprague, vice president, Dr. C. F. Pinkerton, C. G. Cecil and Gordon Adams, trustees, all of Salt Lake City.

DON'T GO TO ELY, YET

For some weeks past all incoming passenger trains on the Nevada Northern have been crowded with men looking for work says the Ely Record of the 17th. These men state that all up and down the main line and even as far as San Francisco it is reported that the Ely district is booming and that labor of all kinds is in great demand. It has even been stated, although the Record has been unable to verify this report, that an item was published in one of the San Francisco papers to the effect that 5000 men were wanted in the Ely district.

The spreading of these reports is very much to be regretted. The Nevada Consolidated is not putting on any more men and it is not likely that any more will be put on for several weeks. Many of the men who came in from the outside have spent almost their last dollar to pay their fare in here and when they arrive they are broke, and finding it impossible to get a job they are a burden on the community.

No unemployed man should come into this district at present unless he has a positive assurance of some kind that he will get a job when he gets here. If he comes without such an assurance he will find himself out of luck, as there are more men than there are jobs right at present.

DIAMOND DRILLING FOR OIL

The diamond core drill, so common in mining, may become useful in testing out prospective oil fields, according to the Bureau of Mines. Recently the value of the diamond core drill was proved by the successful completion of a well in Mexico and another in Kentucky. It has certain advantages over the other drilling systems and these have apparently been overlooked in oil drilling. The equipment is lighter and can be transported more easily, drilling should be cheaper with the improvement in equipment, and it furnishes a continuous core of the formation passed through. This is particularly valuable in testing a well because there is no danger of passing by a sand or stratum carrying oil.

In rotary drilling the hole is full of mud fluid, and in much cable tool drilling the hole is almost full to the top with water, so that when encountering an oil bearing sand, the head of fluid exerts so great a pressure that the oil or gas does not come into the hole but the fluid in the hole actually goes into the sand. Thus, the driller may get no

oil showing and decide the sand does not contain oil or gas and drill deeper. The disadvantage of the core drill is that it drills a small sized hole, which may prove unsuitable for production purposes, but it deserves careful consideration for test work.

NEW BULLETIN ON CONCRETE

While the properties of concrete have been investigated for many years, attention has largely been given to considerations of strength alone. Aside from the action of direct load, deformations are produced in concrete by changes in temperature and in moisture content. With reference to temperature changes in reinforced concrete, it is well known that concrete has practically the same coefficient of expansion as steel, so that the two materials contract or expand together. Moisture content, on the other hand, has the undesirable property of affecting concrete alone. Concrete, like wood, clay, and some other materials, expands when it absorbs moisture, and contracts when it is dried. Steel has no such action.

Bulletin No. 126 of the engineering experiment station of the University of Illinois, entitled "A Study of the Effect of Moisture Content upon the Expansion and Contraction of Plain and Reinforced Concrete," contains some of the results of experiments made by Torata Matsumoto, a graduate student in theoretical and applied mechanics at the University of Illinois, in 1918. Owing to his years of experience as an engineer on harbor works on the Island of Formosa, he was particularly interested in the question of the durability of concrete exposed to sea air and to the conditions found in a tropical climate. It is felt, however, that the results obtained apply to our ordinary conditions and may have many practical applications. Copies of this bulletin No. 126 may be had without charge by addressing the Engineering Experiment Station, Urbana, Illinois.

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SALT LAKE MINING STOCK QUOTATIONS

The range of the market from February 11th, to February 24th, inclusive, Quotations furnished by J. A. Hogle & Co., direct wires to all leading markets, 169 So. Main St., Salt Lake City, Utah, and ground floor of Eccles Building, Ogden, Utah, and Pocatello, Idaho.

Stock.	Open.	High.	Low.	L. S.	CLOSING		
					Bid.	Asked.	Sales.
Alta Mich. ....	.03	.03½	.02½	.03½	.03½	.07½	7,500
Antelope Star							
Alta Con. ....	.06	.07	.06	.06½	.06	.07	8,500
Alta Tiger							
Am. C. Mines .....					.04	.06	
Albion Cons. ....	.11	.11	.10	.10	.10	.11	2,350
Am. Metals ....	.02½	.03	.02½	.02½	.02½	.02½	26,225
Alta Tun. ....	.16	.17	.14½	.16½	.16½	.17	12,500
Bullion .....					.02½	.07	
Big Hill .....	.02½	.02½	.02½	.02½	.02½	.03	6,500
Big Cot. Coal. ....					.03	.05½	
Beaver Cop.	½	½	½	½	½	½	7,000
Bay State ....	.02½	.02½	.02½	.02½	.01	.04	1,000
Black Metal .....					.06	.12	
Bingham Gal. ....	.01	.01	.01	.01	.01	.01	8,000
Cent. Eureka	¾	¾	¾	¾	¾	.01½	2,000
Cedar Talis .....						.01	
Colb Rexall .....	.25	.30	.25	.30	.29½	.30½	5,700
Colo. Con. ....	.04	.04	.03½	.03½	.03	.04	3,200
Crown Point .....	.02½	.02½	.02½	.02½	.02	.03	1,000
Cardiff	1.02½	1.02½	1.00	1.00	.99	1.02½	1,000
Croff .....						.01	
Cott. King .....						.01	
Cott. Metals							
Daly					1.00	3.00	
Daly West					2.25	3.00	
Dragon .....					.05	.10	
Demijohn Con.							
Emma Silver .....	.01½	.01½	.01½	.01½	.01½	.01½	68,900
Empire Mines .....	.03½	.03½	.03½	.03½	.03	.04	1,000
East. Prince .....						.01	
E. & B. Bell					2.35		
Emerald .....					.02	.04½	
Eureka Mines .....	.04½	.04½	.04½	.04½	.04½	.04½	9,000
E. Crown Pt. ....	.02½	.02½	.02½	.02½	.02½	.02½	3,000
E. Tin. Coal. ....						.01	
E. Tin. Con. ....					.05	.07½	
East Antelope .....						.01	
Eureka Lily .....	.08	.08	.08	.08	.07½	.08	4,000
Eureka Bul. ....	.04½	.04½	.04½	.04½	.04½	.05	19,644
Gold Chain ....	.06½	.06½	.05½	.05½	.05½	.06½	1,900
Grand Cent. ....	.42	.42	.42	.42	.42½	.44½	100
Great Western .....					.01½	.03½	
Hamburg Mns.						¾	
Howell .....	.05½	.06½	.05½	.06½	.05½	.06	4,062
Home Run						½	
Iron Blossom .....	.20	.20½	.19	.19	.17	.20	17,300
Indian Queen						½	
Iron King ....	.07	.07	.06	.06	.05½	.06½	6,000
Judge M. S.					2.50	3.50	
Keystone .....	.30	.30	.30	.30	.30	.30	1,500
Kennebec .....					.06½	.08	
Lehi Tin. ....	.01½	.01½	.01½	.01½	.01½	.01½	4,000
Leonora .....	.01½	.01½	.01	.01	¾	.01	13,500
Logger .....	.01	.01	.01	.01	¾	.01½	3,000
Lynn Big Six .....	.23½	.23½	.23	.23½	.20	.25	7,000
Monzonite .....						.02	
Mammoth .....					.25	.50	
Miller Hill .....						.02	
May Day .....					.01	.02	
Mason Valley					1.25		
Moscow .....						.10	
Mich. Utah .....	.26½	.30	.26½	.29	.28½	.29½	9,000
New Quincy .....	.03½	.04	.03½	.04	.03½	.04	17,500
Naildriver .....					.05	.35	
Neva .....						.01	
No. Standard .....	.05½	.05½	.04½	.04½	.04½	.04½	28,500
G. K. Silver					¾	.05	
Opohongo	½	½	½	½	½	½	1,000
Original Ban. ....						.01	
Plutus .....					.10		
Prince Con. ....	.06½	.08	.06½	.07½	.08	.09	12,900
Pioche Brist.	¾	¾	¾	¾	¾	.01	8,000
Price Mining .....	.05	.05	.04½	.04½	.04	.04½	10,000
Provo .....	.02½	.02½	.02½	.02½	.02½	.03	1,000
Rico Arg.						½	
Reeds Pk. C. ....					.01½	.02	
Rico Well						½	
So. Standard .....	.12	.13	.12	.13	.10		1,500
Sells .....	.02½	.02½	.02½	.02½	.02½	.03	21,000
Syndicate					½	½	5,000
Sil. King Coal.	2.27½	2.27½	2.17½	2.20	2.15	2.25	800
Sil. King Con. ....	.47	.47	.45	.45	.45	.46	1,100
Sioux Mns. ....	.01	.01	.01	.01		.02	500
Swansea Con. ....					.01	.01½	
Silver Shield .....	.03½	.03½	.03½	.03½	.02½	.02½	2,100
Tecoma	¾	¾	¾	¾	¾	¾	1,000
Tar Baby .....	.02	.02	.01½	.01½	.01½	.02	19,500
Tintic Cent. ....					.01	.01½	
Tintic Stand.	2.17½	2.17½	2.00	2.00	2.02½	2.05	13,475
Uncle Sam .....						.01	
Utah Con. ....						.01	
Union Chief .....					.01	.05	
Victor Mng. ....					.01½	.02½	
West Toledo .....	.01½	.01½	.01½	.01½	.01½	.02½	200
Walker Mng.	2.45	2.55	2.45	2.52½	2.50	2.70	520
Woodlawn .....	.08	.08	.08	.08	.07	.09	3,000
Yankee Con. ....					.01½	.04	
Zuma .....	.09	.09	.08½	.08½	.08	.09½	2,500

METAL MARKET QUOTATIONS, FEBRUARY 23d

Silver	99¾c
Silver (in London)	33d.
Copper	13@13½c
Lead (New York)	\$1.70@4.80
Spelter (East St. Louis)	\$4.50@4.55

ASSESSMENTS PENDING

Lehi Tintic Mining Company, 1c. a share. Delinquent March 4. Sale day March 31.	
Tar Baby Mining Company, 1c. a share. Delinquent March 10. Sale day April 8.	
Beaver Copper Mining Company, ½c. a share. Delinquent April 5. Sale day April 25.	
Leonora Mining Company, ¼c. a share. Delinquent March 13. Sale day April 8.	
North Standard Mining Company, 1c. a share. Delinquent March 16. Sale day April 17.	
Syndicate Mining Company, 1 mill a share. Delinquent March 13. Sale day April 1.	
Iron King Mining Company, 1c. a share. Delinquent March 18. Sale day April 14.	

ORE SHIPMENTS

Ore shipments from the mines of Park City for the two weeks ending on the 24th, amounted to 5,485 tons, as follows:

Judge Allied Companies	3,087
Ontario Silver Mines	1,002
Silver King Coalition	1,396

Total tons

Shipments from the mines of Tintic to the mills and smelters during the two week period ending on the 24th, amounted to 276 carloads, as follows:

Tintic Standard	118
Chief Consolidated	102
Centennial Eureka	8
Dragon Consolidated	5
Eagle & Blue Bell	13
Grand Central	5
Gemini	4
Bullion-Beck	4
Tintic Mill	2
Empire Mines	2
Victoria	2
Iron Blossom	6
Swansea Consolidated	5

Total Carloads

EASTERN STOCK QUOTATIONS, FEBRUARY 23d.

Anaconda Copper	48½@48¾
Butte & Superior	25¾@26¾
Chino Copper	25½@25¾
Ray Consolidated Copper	13¾@13¾
Utah Copper	61½@62½
Bingham Mines	13¼@13½
Chief Consolidated	3¾@3¾
Daly West	2½@2¾
Mason Valley	1¼@1½
Utah Apex	3 @3½
Utah Consolidated	1¾@2

WANTED TO BUY WOOD PIPE—I want to purchase about 6,000 feet of second-hand woodpipe from 26" to 40" diameter. Must be in first class condition. JAMES GOLDEN, B 10 Kenyon Hotel, Salt Lake City.

FOR SALE—Two splendid gold properties in Montana, comprising sixteen claims. Tonnage of ore in sight of good milling grade. Will give a short option for an examination. For further particulars call on or write THOMAS FLYNN, 823 Dearborn Ave., Helena, Mont.

DEVELOPED MINE FOR SALE—Copper Belt property of about 100 acres patented, near Lusk, Wyoming. Well developed, thousands of feet of shafts and tunnels, mostly in solid rock. Much ore on dumps. No indebtedness. Clear title in name of former bondholders. \$150,000 has been expended. Will sell for \$25,000. W. A. TITUS, Fond du Lac, Wis.

WANTED, POSITION—To connect with party that can use man six years superintendent and master mechanic California mine; eight years traveling erecting engineer and trouble man, engines, boilers and machinery manufacturing companies; ten years chief engineer electric light and power company. Expert on engines, pumps and air troubles. Thoroughly experienced engineer, millwright and machinist. Five years night school studying assaying and chemistry. Absolutely reliable, trustworthy, capable man. JOHN BEECHER, 1312 Octavia Street, San Francisco, Cal. —(Adv. 2t.)

Wanted—Job by man and wife in mining camp. Wife to cook for men; man to work at mine. Address: H. E. Wagner, No. 7 So. Fourth East St., Salt Lake City, Utah. 2-1t-30-15.

The Salt Lake Mining Review

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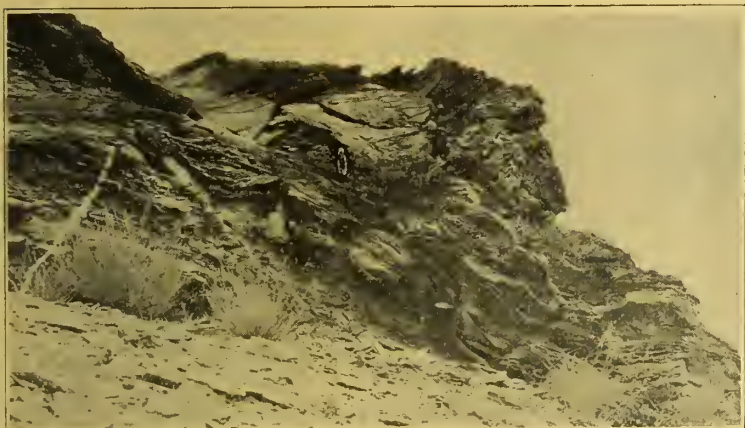
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OIL PROBLEMS IN THE UINTA BASIN.—(VI.)

By Prof. Earl Douglass

A REMINDER:—A complete study of the geology and oil-conditions of the Uinta Basin will require many years of careful study by many competent workers. The objects of these articles is twofold. First: To give a preliminary view of the various phases of the origin, movements, changes, concentration and storage of petroleum, where conditions are ideal for observation and study; and, Second: A presentation of the data already collected, so that one may judge whether or not the facts indicate that oil exists in paying quantities.

Origin of the Gilsonite. We have seen that the workable veins of the Bonanza-Cowboy group occur in the Uinta sandstones and sandy shales. Though some petroleum



Peculiar Sandstones below gilsonite veinlets at "root" of Wagon-hound. They contain thickened oil

doubtless occurs in these formations, it seems doubtful that there has ever been sufficient to form these great veins, or if conditions have been favorable for their formation here. It was seen, however, that the Bonanza vein extends downward—though split into smaller veins—into the underlying Green River shales. We have seen also that these shales have here every appearance of being rich in oil.

One naturally feels at first, when in eager search for the source of the gilsonite, that here lies the key to the solution of the problem. Here is an opportunity for the inspissation or thickening of the oil; as, by erosion of the rocks into deep canyons with southward-facing slopes, there has been abundant opportunity for the access of the atmosphere and warmth of the sun. These conditions would seem to answer two of the questions which were asked at the beginning of the search:

"If the gilsonite is the heavier residue of petroleum, what has become of the lighter or more volatile portions?"

"Where, when and under what conditions did this inspissation or vaporization and oxidation take place?"

Here are openings in the form of fissures ready to receive the petroleum or its thickened residue.

Here, too, if our position is right for a comprehensive

view, we get a strong hint as to the cause of these fissures.

As we look to the southeastward over the bare conically-weathering hills of shale beyond White River, we see plainly, by the distinct marks of stratification and the contour of the bands of dark shale, that the beds dip toward us from the southeastward, that they also dip to our right or southwestward, and to our left or northeastward. We have then not only the universally recognized northward "regional dip" (northwestward here), but a plain easily recognized minor anticline extending in an approximately northwest-southeast direction.

This is practically in the same direction as the larger fissures which contain the gilsonite in the Uinta formations, and the smaller fissures—which sometimes contain gilsonite and which sometimes do not—in the Green River beds. I do not remember that Prof. Geo. H. Eldredge, in his descriptions of these veins, has mentioned these cross-folds; but he gives the general dip of the beds as N. 55 degrees W., while he gives the direction of the veins of the Bonanza group as N. 60 degrees W.

If the strain on the crest of this cross-fold were the cause of the fissuring, this simple explanation would answer several questions which were proposed in the fourth article, and which at first seemed so perplexing.



Shale. Very rich band middle of Deep Canyon, near Ute plant

(1) The cause of the veins being parallel, would be self-evident, as their course would be determined by the direction of the fold.

(2) They were perpendicular because the fold was symmetrical, therefore its axis was perpendicular, and, we might say, the strain was symmetrical. Of course the veins on either side of the central axis of the uplift would naturally incline downward toward the plane of the main

axis; but if the fold extended to a great depth, as it probably did, this would not be noticeable at the surface.

(3) The main or larger veins are in the Uinta formations because much of the rock is a heavy massive sandstone and it therefore gave way to the strain at longer intervals and produced wider cracks or fissures. On account of the nature of the rock, too, the Green River shales parted at shorter intervals. This difference in the manner of fissuring is often beautifully shown in some of the escarpments of the last named formation, and is well seen in some of the photographs which are presented with these articles. Some beds show ideal examples of fissuring, while those above and below may exhibit none which cut through the beds.

(4) This would also account for the fact that the veins of gilsonite are so pure and free from debris, as they were closed above and below.

The "oil shales" (kerogen shales) of the Green River deposits are admitted to be the richest of any of equal extent which have yet been discovered, but we have been repeatedly warned in articles and books not to be deceived by the idea that this is any indication of oil which may be obtained by the use of the drill. It has been repeated time after time that these shales contain "no oil as such." We are told that they contain oil in the making, but nature has not completed the process, so to obtain the oil, destructive distillation is required.

I confess I have felt much as Josh Billings did when he was assured that a man couldn't get drunk on beer. He said that he believed them to the best of his ability; and yet he couldn't understand why, after drinking quite freely of it one night, he had such a terrible time getting home, and why, after getting home, he was unable to catch the chairs which were circling around the room, or why when

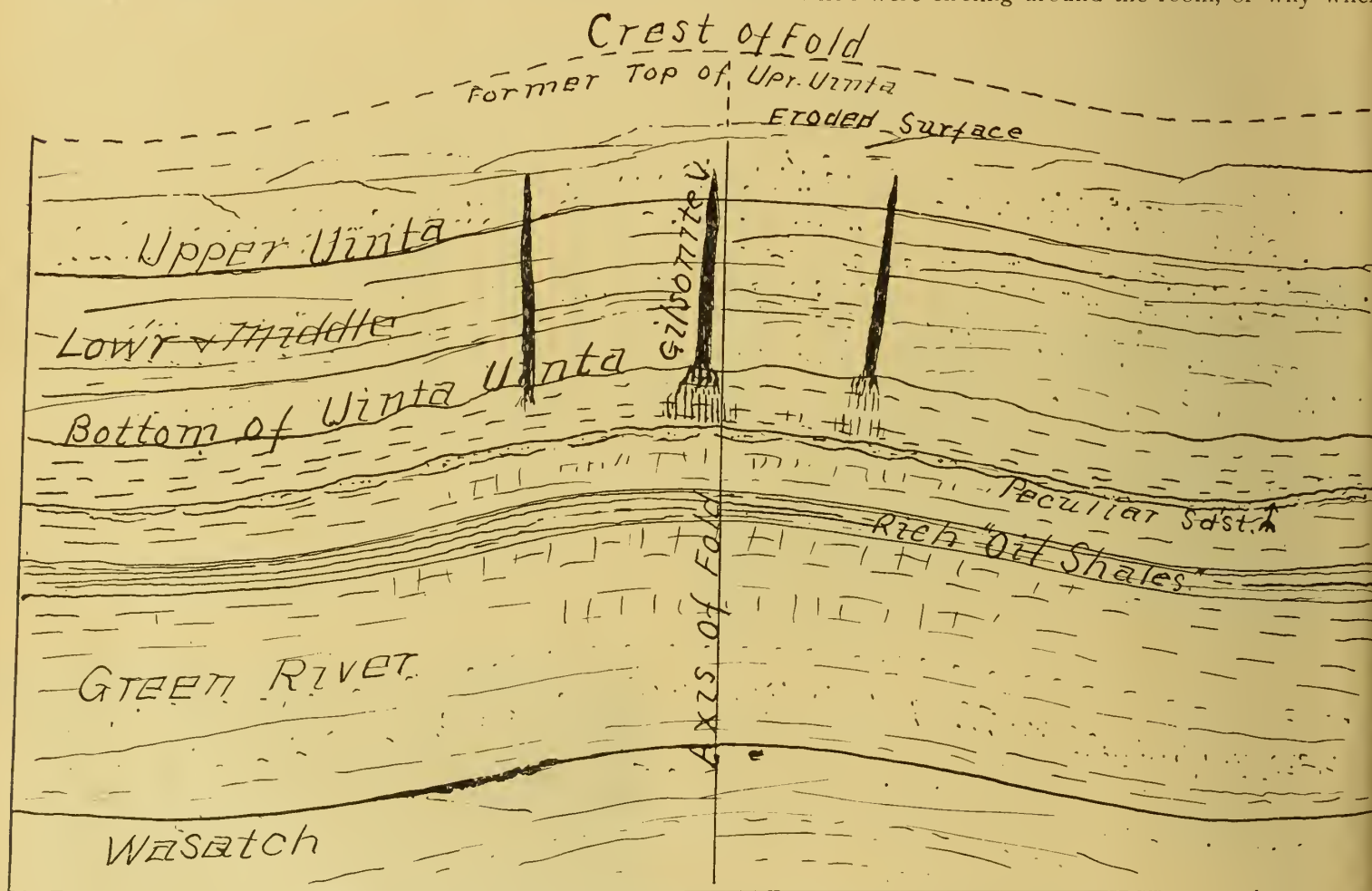


Diagram Illustrating Relation of Gilsonite Veins to fold and to different formations

We will see if future observations confirm these ideas.

As has been previously stated, our observation thus far have created a surmise that the Green River is the source of the gilsonite; but if we can avoid it, we do not wish to stake too much upon "suspicion." We wish to know whether or not all the facts confirm this hypothesis so that we can reduce the uncertainty to a minimum.

We now find ourselves face to face with a widespread impression or belief which, if founded on the truth, might save us the trouble of further search for the source of the solid hydrocarbons in the Green River formation. This belief is, no doubt, one of the principal causes which has hindered so long the serious consideration of the Uinta Basin as a prospective oil field.

he made a lunge for one that was passing, he was too late for that one and too early for the next, and so unwillingly compromised the matter at the expense of the floor and his own bodily comfort.

As to the assertion that there is no oil as such in the Green River shales, I have believed to the best of my ability, but wherever I have observed them the facts are so numerous and overwhelming that I have had to abandon it absolutely. As will be seen later, one does not need to rely on single testimony—there are other witnesses whose declarations command the highest respect; but, higher even than this, there is the ever open and unfailing tribunal of facts.

I have not yet had the time and opportunity to keep

ully posted on the matter, but I believe that those who are making a study of the "oil shales" (kerogen shales) are conscious of the fact that there is more or less free oil in these shales. This is not the phase of the matter which they are especially investigating—"the thing they are after"—so they have perhaps not laid particular emphasis upon it.

To those who are in quest of oil "as such" it seems almost impossible to overestimate the fact, if there are abundant evidences of free oil in the Green River formations.

As yet we have had only a casual glance at the conditions. It was stated at the close of the last article that we would see if other veins besides the Bonanza extend downward into the Green River shales.

The Wagonhound Vein

The Wagonhound vein, coming from the northwestward, like the other veins of the group, crosses the Wagonhound canyon which is traversed by the Uinta stage road. It passes between the "breaks" between the higher benchland and the White River canyon, and extends downward into the Green River formation near the head of Deep canyon, a short narrow gorge which enters the canyon of White River by the Ute Oil Shale plant.

This is not a very large vein. Near where it enters the Green River it is only about one and one half feet in width. It maintains about the same thickness for a short distance in the shale. Where it cuts through the shoulder of the cone-shaped side of the weathered slope, it is exposed by a prospect hole. On the undisturbed slope toward the canyon it cannot be definitely traced, but small fragments of gilsonite can be seen along its course.

At the foot of the slope and at a lower geological level, with pick and shovel, some friends and myself, made an excavation for the purpose of tracing the course of the vein to the brow of the canyon and finding its condition at a lower level. We had already tried to trace it down the side of the small branch of Deep canyon which lay in its course. We found there many small vertical fissures in the shale, but none of them were filled with gilsonite. After we had dug off the weathered surface in our search for the continuation of the vein, and had swept away the dust and debris, we saw a small vein of gilsonite, and near it another, and another, until the whole area which we had exposed was seen to be cut with small veins from the thickness of a sheet of paper to an inch or more in width. This condition can be best understood by studying the photograph which was taken after the excavating was completed. These veins extend in the same direction as the larger ones and have similar straight-sided vertical walls. It would have been interesting to extend this excavation laterally to ascertain the width of this band of veins, but this was not done. About a dozen veins were shown here in a zone three feet in width. **Please notice that the shales appear more massive beyond the weathered surface.** The shales were moist with water between the layers and would undoubtedly have shown the presence of oil, but unfortunately, we did not test them.

Near where the excavating was done there were bands of the dark, tough, compact shales which are blue and often crinkly on the weathered surface. These are one variety of the rich "oil shales," and these, at least in part, form the dark bands which are seen in the weathered slopes of the Upper Green River.

Peculiar Sandstones

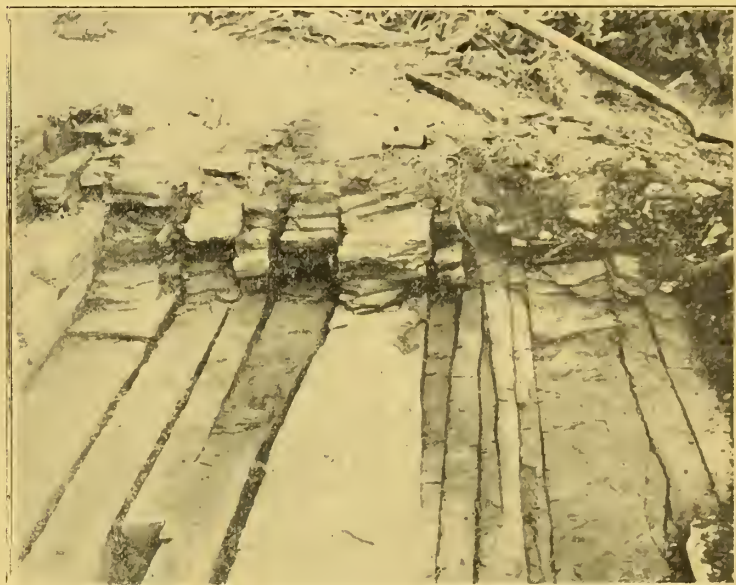
Following the line of the vein to the rim of the canyon before mentioned, it is seen that this rim is composed of a peculiar sandstone, the origin of which is puzzling. There

are centres of nuclei around which the slabby sandstones are twisted in an unusual manner. The underlying shales are also bent and distorted. It seems that there is a tendency to form concretions. The rocks, especially the nuclei and the band in which they occur, shows a white efflorescence of some mineral, and the rocks give tests for asphaltic oil.

This sandstone is seen along the rim of Evacuation Creek to the southward and at Watson ten miles south of here. It has very much the same appearance and character at these places, though, I believe, it is not found at this level in all localities and it is subject to local change.

Below this there are shales resembling those above. They are usually fissured but the fissures are open—not containing gilsonite. In many places there are impressions of plants and insects.

Descending the canyon we come to a band which seems richer in oil. Below this there are more massive appearing deposits, part of which resemble the spotted asphaltic rock which was mentioned as occurring where the Bonanza vein enters the Green River shale. The shales just above are fissured—not perpendicularly but diagonally—and some



Small Gilsonite Veins uncovered by excavation below where the Wagonhound vein enters the Green River formation

of these fissures contain gilsonite. It does not appear that these veins are connected with those above. We are now perhaps 150 feet below the top of the shales.

Below this the rock still seems rich in oil, and soon a very rich, dark, oily band is seen. It has a very much "daubed" appearance on the surface where it weathers into greasy dirt. In some places the oily substance has oozed out and it forms a black coating like tar. The first impression is that this is gilsonite in the making, but the crevices, even those that cut through it, are not filled with this mineral.

This rock makes an interesting example for study as it is to a great extent typical of the rock here only; for some reason it appears to be unusually rich.

On breaking or splitting the rock open at some of the weathered parting-planes, the black tarry substance is seen to extend inward only an inch or two. Farther in on the weathered surface of the parting-planes, the rock is gray and is dotted with round white spots, undoubtedly of paraffine.

When portions of the rock are ground up, put in a test

tube, and treated with chloroform, the liquid does not immediately turn dark as when some asphaltic rocks are treated in this way; but the solution slowly turns to an amber color. When this is evaporated on a white porcelain dish there remains a thick, sticky, yellow residue which coats the dish and has a strongly asphaltic odor.

A fragment of the rock about 4x5x3 inches was put in the fire over burning coals. It burned with a flame for a half hour or more and then the flame ceased. The burning out of the combustible matter allowed the rock to split into layers in the direction of the bedding-planes. About half of the rock was shaly and split into thinner laminae, while the other half, which was more compact, did not split so finely but checked and broke in a perpendicular direction. When the rock was split open it was still black apparently from the large amount of remaining carbon. Part of the shaly portion was again subjected to greater heat for a longer time and, when taken from the fire was of a light gray to yellowish gray, brownish gray, and bluish gray on the surface, and bluish gray when split open. The yellow and brown colors are evidently due to the presence of iron. Still further heat reduced the bluish tint and increased the yellow and brown. This is true also of the more compact portions.

Various samples of both kinds of the rock were examined under the microscope to ascertain whether or not the rock was composed, to any great extent, of fine sand which had probably been transported by running streams. Small transparent grains were seen, but many of them were more or less angular in shape, some of them suggesting volcanic dust; but they were probably aggregates of crystalline mineral matter. There are very minute rounded grains which might be quartz sand but this is doubtful. If so it is so fine that it might have been transported to its lodging-place by dust storms.

MONTANA-BINGHAM ISSUES REPORT COVERING OPERATIONS FOR YEAR 1921

In submitting the annual report of the Montana-Bingham Consolidated Mining Company for the year 1921, and which was mailed to stockholders a few days ago, President H. H. Green states that, notwithstanding the depression in the copper market, the Bingham property made a very creditable showing, largely attributed to the fact that the fluxing quality of the ore made possible an arrangement with the smelter whereby the mine was enabled to continue operations throughout the year. He explains that all costs of operation, including prospecting and developing, new construction and equipment were taken care of with the revenue received from copper ore sales, but that after writing off depletion, depreciation, issues of treasury stock, and bond interest, a net deficit of \$50,805.53 is shown.

The report of General Manager Imer Pett covers all phases of the mine operations. He states that the Fortuna mine is considered the most valuable of the company's possessions, and that: "Prior to the acquisition of the Fortuna mine by the Montana-Bingham Consolidated, its ore was transported through the Keystone tunnel and then hauled to Lark by wagon or by an electric tramway belonging to another company. The tram was taken up in 1909 and subsequently the ore was hauled to either Midas switch on the 'high line' of the Denver & Rio Grande railroad or to Lark. This added considerable expense and greatly limited the production which was confined to the higher grade ores.

"Attention is called to the fact that the 1921 output is

the maximum of shipping ore ever produced in any one year from the property, and represents about one-third of its entire production.

"This was made possible by reason of the outlet afforded by the Montana-Bingham tunnel, which, with the new ore-bins erected on the railroad near the portal of the tunnel in Bingham Canyon, gives a direct connection between the mine and railroad, and enabled us to take full advantage of the more favorable smelting rates on the low-grade ores."

The report shows that the mine produced in 1921, 416 carloads, or 24,525.68 tons of ore, having a gross value of \$192,027.58, and a net value of \$140,188.82 after deducting costs of freight, smelting, sampling, and assaying.

The metal contents of the ore were as follows: Gold, 1,354,941 ozs.; Silver, 42,869 ozs.; Copper, 1,581,857 lbs.; Lead, 21,402 lbs.

The average assay of the copper ore was: Gold, .059 ozs.; Silver, 1.84 ozs.; Copper, 3.43 percent.

A little lead ore was also shipped, which assayed: Gold, .045 ozs.; Silver, 6.2 ozs.; Copper, .7 per cent; Lead, 15.8 per cent.

At the annual meeting of stockholders H. H. Green was elected president; Charles E. Adderley, vice president; J. R. Brain, secretary-treasurer. These with A. G. Mackenzie, Frank Thornburg, A. L. Headberg and Harry Bowman constitute the directorate. Imer Pett continues as general manager and T. P. Billings as engineer and superintendent. Messrs. Adderley, Mackenzie and Thornburg make up the executive board.

DRILLING RESUMED AT FALLON

The Diamond Oil Company, which has been hung up for some three months has resumed drilling. Repair work on the plant was begun about three weeks ago and this completed the Standard rig began drilling again early part of last week. During the first three days drilling 30 feet of new hole was made. The formation is reported as being a conglomerate carrying considerable gas and oil.

At the Fallon Union the shell of the cartridge that was put into the hole some months ago with the idea of shooting it to loosen up the formation and induce an oil flow has been raised 120 feet from the bottom of the hole. The powder has been washed out and George Edson Porter is of the opinion that barring further accidents the hole will be cleared in a few days. One half of the crew has been laid up with the flu but work has been kept moving as best possible under conditions. A new feed pump has been installed in the boiler and other repair work completed. Notwithstanding the bad weather and worse road conditions many have visited the well during the past week. The interest centered in this well, is such that bad roads does not keep people away. The bringing in of even a small well means millions to the Fallon field.

It is stated that the Big 4 will resume drilling within two weeks. Mr. W. B. Nichols of W. B. Nichols & Sons who financed the Big 4 is now in California making arrangements for drilling at the Big 4.

The Meyers well over on the Hoover ranch is still hung up owing to weather and other conditions.

The Lahontan is drilling and making a good showing both as to depth and oil indications. The Syndicate Oil Company on the Jewell & Jones ranch, has the six-inch casing about all in place. It is reported that it is the intention of the company to try and make more depth with the present rig but with a smaller bit than first used.

MANIPULATION OF AN ORE BY MODIFIED BALL-MILLING

By O. A. Gates*

Any visitor to the zinc district of Southwestern Missouri and the adjoining two states can hardly be kept from wandering around some of the immense tailings piles and mine dumps that are such a feature of the district. If one has an interest in the rock itself, he will be interested in finding—on the surface of large boulders on the dumps and attached or included in the tailings from the mills—particles of blende which look as though they should have been saved.

There has been plenty of criticism of milling methods in the Tri-State Zinc district, as it now appears to be called since the great development of the newer fields in Oklahoma in recent years. And bright operators and enthusiasts have gone into that district with ideas from other districts, 'showed the natives a few modern methods,' got burned, and disappeared. Men with broader vision have pointed out that circumstances are different, and complicated by the agricultural and land-holding conditions, making for small rather than large operations, and requiring a mill for nearly every small property.

The character of the ore is quite different from many of our western ores, consisting to a large extent of flint, with the economic minerals largely on the fracture planes of this flint. We know that flint is hard to crush, because we use it for tube mill pebbles. And in the handling of it within the plant the arrow-like edges are particularly damaging to equipment. Hence rolls are run at such slow speeds as to seem unreasonable to the operator accustomed to peripheral speeds of over one thousand feet a minute; fine grinding is not done, and the aim is to get the material through the mill in a hurry. Tailing losses seem rather high, and on the whole, it does appear that improvements could be made.

In a recent report of progress of investigations (Serial No. 2314 of January, 1922) by the Bureau of Mines in cooperation with the Missouri School of Mines and Metallurgy and Miami School of Mines, account is given of some interesting developments of possible improvements in milling methods worked out by two of the metallurgists of the bureau (W. H. Coghill and C. O. Anderson) assigned to that district.

The investigation had particularly to do with the freeing of included blende in the "chats" (locked grains of blende and flint). These have been, like other middling products, handled in various ways, and often formed part of a considerable circulating load without much economic return.

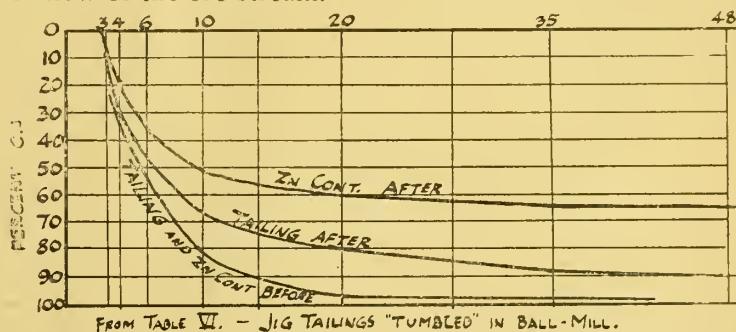
As is usual in milling work, it was found that in the finest sizes of the crushed ore, the percent of zinc mineral is the highest. Considering the tailings from the rougher jig for this particular ore, which was more or less representative of the more difficult ores of the district, as containing but the chats and the final tailing, it was found that the sizes finer than 20-mesh, and excluding the very fine material carried over by the high current of water, carried much less zinc than did the coarser grains. It was further found that from a rougher jig tailing a chat could be obtained that contained about five times the zinc in the tailing from the same process. The matter of treatment of these chats, or middlings, marks the departure suggested by the work of these experimentors.

Because the blende was frequently exposed on the sur-

face of these chats, and flaky grains frequently got into the chats or tailings, and because the gangue is particularly hard, some surface action which would break the blende without doing much work upon the flint was suggested. This was accomplished by tumbling in a ball-mill, the idea being to keep the material in the ball-mill such a short time that the amount of work spent upon the flint would be very small indeed. The paper itself does not say whether balls were used in this mill, although one is led to believe that balls were used, by the use of the term "ball-mill."

The experimental work which is published in this connection shows that they made their most conclusive experiments upon the tailing rather than upon the higher grade chats, with a result that about 34% of the zinc in the tailings was put into the minus 48-mesh (less than ten percent of the total weight) in condition for treatment by flotation or tabling, and apparently cutting the tailing assay from about 1.1% zinc to about 0.7% zinc. They do not publish results upon the chats, as this is more of a preliminary paper, but it is reasonable to assume that as good or better work can be done upon the chats.

It is probable that the tumbling operation in the ball-mill could be started earlier in the flow-sheet, and it is probable that some lower grade ores might be added to the mill feed, if they contain any coarse crystals of mineral. It is possible that a tumbling operation started earlier would free more of the mineral earlier, and make possible rejections of coarse material with very little expenditure of energy for crushing. That is, it might take more than one cylinder mill to do the work, replacing some of the rolls, and in circuit with very coarse screens; these mills being comparatively small in crushing capacity, but large in rate of flow of the ore-stream.



FROM TABLE VI. — JIG TAILINGS "TUMBLER" IN BALL-MILL.

The crushing-surface diagram accompanying this article has plotted, in addition to the screen analysis of the tailing before and after crushing, the percentage of zinc in the product after crushing. The line for the cumulative zinc content before crushing coincides with that of its screen analysis. This shows by the ratio of the ordinates of points on the "tailing after" and "Zn Cont. after" lines how the blende accumulated in the finer sizes rubbed off in the tumbling operation. The finest 10% "before" contained but 10% of the zinc, the finest 10% "after" contains about 34% of the zinc.

Whether these experiments indicate very great possibilities for increased savings in milling in other districts is not to be stated here. But they do emphasize the value of manipulation of the crushing operation, rather than the blind crushing to get all ore to pass given sizes.

At the intermountain experiment station of the Bureau of Mines at Salt Lake City, cooperative work is being conducted with the Industrial Potash Corporation relating to the extraction of potash and alumina from low-grade alunite.

*Mining Mechanical Engineer, Salt Lake City, Utah.

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*Illustrated.

THE WHALE SWALLOWS JONAH

And it finally came to pass. For two years or more, periodically, it has been rumored that the Engineering & Mining Journal was to "buy out," or "absorb," or "gobble up," or "consolidate" with the Mining & Scientific Press. The latter publication has persistently declared that all such reports were groundless, and the technical mining world had about reached the conclusion that the Mining & Scientific Press would be able to escape a similar fate to that which befell the Western Mining World, of Chicago, several years ago.

But the Fates have decreed otherwise. Formal announcement has been made that on April 1st—a fateful day in itself—the two great technical mining journals will "consolidate" and hereafter be known as the "Engineering & Mining Journal-Press," with J. E. Spurr as editor and T. A. Ricard as contributing editor in the West, with San Francisco as headquarters.

Let us hope that the union will prove a happy one for all concerned. In the past—if we have been able to properly comprehend the policies and opinions of the two publications through reading their editorial utterances—neither has had a very profound respect for the other. Even now, after the wedding day is announced, we find the groom taking an irritating fling at the bride by formally announcing that "a mining journal, therefore, to keep ahead of the times must also be constantly progressive and must grow."

A little farther along in the nuptial announcement, we find this rather disturbing sentence: "The strength of the

Engineering & Mining Journal is great in the Western states; Mining & Scientific Press is well known and influential in the East." This would seem to indicate the truth of the old adage that "a prophet is not without honor save in his own country."

Then comes a few sentences of veiled threat and presumption on the advertising policy of the sheet "merger" that modesty, at least, would have deleted from the announcement. Listen to it: "One paper that covers the field! (in italics). This is what the mining engineer and the mine operator want. This will give the maximum of publishing efficiency. This is what the buyer of mining and refining machinery and supplies needs—one recognized advertising section and buying guide in which to look for suggestion and information. This will give the manufacturer the opportunity he seeks—one big paper in which to concentrate and makes his sales efforts genuinely effective."

There seems to be only one conclusion to draw from this statement, namely, that the advertiser is expected to make up his mind to patronize the big catalogue to the extent of every dollar he may decide to appropriate for advertising purposes—a proposition that would prove just about as valuable as space in a state directory. Of course it would destroy initiative in advertising campaigns and leave the advertiser no choice in the selection of a medium through which to describe his wares and reach prospective patrons who might not care to wade through the pages of the great international mining index.

In the deal just closed the whale has swallowed Jonah, sure enough. It remains to be seen whether the whale can swallow the men of business initiative and competitive enterprise who go after the trade of the metal mining states of the West. Our guess is that it can not.

BUREAU OF MINES CRITICIZED

In the February 15th issue of the Mining Review, among the "Bureau of Mines Investigations" items, appeared the following:

Mine operators in the Tonopah, Nevada, district are having considerable trouble with drill steels, as different lots received require different heat treatment in tempering. At one mine the steel does not stand up in hard ground when used in the stopers with the outside water spray. At two different times in one mine the drill bits, after being used five or ten minutes, were noted to be at red heat, as drawn from the holes. The problem is being studied by the Bureau of Mines in the course of its general investigation of drill steels.

A Nevada correspondent sends back the item, emphasized as noted, and then proceeds to comment upon it in this fashion: "How can this be possible? The lowest dull red that can be noticed in the dark is about 800 degrees Fahrenheit. While 'dull red' in the day-time is variously given for different steel as from 1027 degrees to 1150 degrees. The rock heat of the hottest mine in Tonopah will not exceed 1150 degrees. Neither the heat of the hammer blow upon the steel, nor the blow of the steel upon the rock, could produce this temperature. I know of no piston drills working in the district, and even so the friction of the drill in the hole would not produce such a temperature. But it will be noticed that the machines are fitted with outside water spray. The temperature of steam in steam-boilers carrying 600 pounds pressure is but 485 degrees, or about half the temperature of very dull red heated steel. More than this the temperature inside of an automobile cylinder is much hotter than this, yet the water jackets keep the steel from becoming red. I fear this will be found to be only a case of some miner saying: 'my steel comes out of the hole red hot,' when it was merely too hot

to be handled—probably a figure of speech known as ‘exaggeration’ to grammarians.”

EGO

Under recent conditions neither Journal (E. & M. J. and M. & S. P.) can go confidently forward in a progressive expansion. The development of mining more and more clearly indicates the conclusion that there is room and need for only one really great mining journal, not only for the country, but for the world, which also is daily being knit more closely together.—Engineering & Mining Journal, March 4th.

“How big was Alexander, Pa, that people called him great?”

It is currently reported that since the first of the month a Tintic mining property has been “salted” for the purpose of making a stock-sale drive in the interests of some of the “insiders.” According to report it was an awfully crude piece of business, and about as wicked in conception as it was crooked in manipulation.

About the best piece of mining news that has developed during the past two weeks is the announcement of Manager Wraith, of the International Smelting Company’s Tooele, Utah plant, that his company was in the market for ores with which to build up the “beds” preparatory to a resumption of smelting operations at the big plant, which has been closed down since early last summer. This is real, tangible evidence that the clouds are lifting.

“EFFICIENCY AND ECONOMY”

Words by Pat Ladigan—Music by R. C. Neenan

With a club in his hand and a look of righteous anger in his eye—both eyes—Pat Ladigan descended on my cabin a few days ago. In his pocket was a copy of the Mining Review, in his voice the rage of virtue which had been assailed.

“What do you mean by calling me a liar?” demanded Pat. “You’re another one of those mule’s papas that hafta insult a feller just because you don’t agree with him, ain’t yuh? Sure; all you gotta do is holler ‘liar!’ and you win the argument. If you weren’t fossil ivory from your chin north, I’d be tempted to percolate your hide so full of holes that it would make a fly screen. Realizing, however, that you was born that way, I’ll let you off with a warning.

“I didn’t intend to have you give away my cure-all for the ailing mining industry. That idea is worth money. Any idea that disposes of a question as thoroughly as mine does is valuable. Maybe it seems foolish to suggest prohibiting prospecting. Maybe it is foolish, but it has this merit, anyway: It won’t cause many arguments, because everybody seems to agree that it is all damnsense, which makes it different from most other mining-law revision schemes—everybody doesn’t agree that those ain’t practical.”

There I found my first chance to break in on Pat’s verbosity and tell him how much I regretted having referred to him as a “liar with a hole in the ground.”

“Oh, let it go at that,” said Ladigan. “If I listen to you a minute longer, I’ll begin believing you. Your tongue is as smooth as a slickensides hanging wall. You ought to try selling oil stock. You chatter away like a jackhammer—”

“Well,” I interrupted his praise, “A jackhammer does its work, does it not?”

“Sure!” Pat remarked sweetly, “It bores.”

“By the way,” he began again, “I read this man Bal-

let’s article on efficient mine management in the Mining Review. Why can’t you write something sensible like that? He knows what he is talking about. Most mines that I’ve seen have been run by people whose motto was: ‘If it’s a good mine, it will stand any amount of expense; if it isn’t, we’ll stick the stockholders for another assessment!’

“Fact is, I could write a book on how not to operate a mine, from what I have observed. First rule would be, ‘Put most of your money into fancy offices, build a lot of ornamental ore bins, bungalows and whatnots, then spend what’s left—if anything—underground.’ A lot of mine mismanagers won’t need that there book—they’ve had practical experience at being impractical.”

“Since when,” I asked impolitely, “have you become an authority on efficiency. You’re becoming childish; you sound like a School of Mines freshman.”

“Listen, Impudence,” retorted Pat wrathfully, “I had my first lesson in efficiency back in Kansas, at my good old mother’s knee, and I have received a lot of lessons since. There was a drouth one summer, back in my boyhood home and water was as scarce as it is in a mining camp dance hall. That’s where Ma showed her efficientuous. She’d heat a pan of water, wash the dishes in it, bathe the baby in it next, wash the faces of the rest of us, then scrub the floor, before taking the pan of water out to irrigate her garden.

“I ain’t one of them ignorant weevils that think efficiency and economy are nothing but extra-lateral rights to chop wages and hire extra bosses. No, sir!

“As I started to begin saying a while back, mine mismanagement is one of our greatest out-door sports. Next to moonshining it is the most popular misdemeanor in the Rockies. I ain’t aiming my aspersions at our mining engineers, either, but a numerous number of small-mine directors—or directors of small mines, take it either way—are too dog-derned economical to have a real engineer on their staff.

“I heard one of these mining insects make a speech one time. He knew just enough to be pestiferous. He rears up on his hind legs and orates to the extent of several thousand words and a pitcher of ice-water that ‘Mining is a Business!’

“Hell! The way his type do it, mining is a crime. I recollect one group of his type that started up a little mine in Colorado. Under sensible conditions that there mine would of been a regular mint; but them there efficiency sharks were using the money of a lot of optimistic rainbow chasers in the East, and their idea was to have a lotta pretty buildings on the ground to make a lotta pretty pictures, to send back East as evidence of what a fine producer the mine was a-goin’ to be—in the sweet by and by.

“Long about the second month, the manager, superintendent and the treasurer each discovered that in order to preserve the dignity of their impositions they each hadda have an automobile. Rather than offend their self-respect, they made out a fine, fat check on the company’s account—and charged three cars to ‘incidentals.’

“Next day there was a bulletin at the mine’s mouth, explaining that ‘In the interests of economy, the officers are compelled to announce a fifty-cent cut in the wages of all underground workers, to take effect at once!’

“Did I hear someone say mining is a business? Sometimes it’s a circus—for the other feller. Did I ever tell you about ‘Preparedness’ Simpkins and his Bright Idea?”

“No, not for a couple of days,” I replied. “But go ahead.”

"Well," said Pat, "I don't believe I ever told you about this Bright idea. Ef I did, your mind is too weak to remember it, so I'll take time to inform you.

"'Preparedness' had started to sink a shaft up on a windy knoll. He was in a gosh-awful hurry to get that shaft down and start sending nuggets to his friends—yeh, that's the kind of a guy he was. Every time his shaftmen took a half shift to place a set of timber, 'Preparedness' had seven fits and a headache because the hole wasn't getting no deeper. It looked to him as if there was a lot of inefficiency about this old-fashioned way of sinking a shaft, so he goes home one night, pulled out a few fistfulls of hair, wrote a lot of figures—and gave birth to the 'Bright Idea.'

"Next day, he hired a crew of carpenters and timber-framers. Then he told us old fogies what he was agoin' to do. He meant to build up ten or a dozen shaft-sets into the air over his shaft and, says he, 'as the ground is removed from below, the timbers will automatically settle in position.'

"Well, there were too many reasons why his scheme wouldn't work to try to start explaining them, so everybody kept still—and got another lesson in economy and efficiency, with reverse English.

"'Preparedness' had built a head-frame over his shaft that was big enough and high enough for the Anaconda, so he had room for his 'automatic' timbers inside it. He was as proud as a toy poodle in a lemonsine when, after a couple of weeks, the gang had timbered in fifty perpendicular feet of atmosphere. He 'pointed with pride.' We 'viewed with alarm,' 'cause it shore was a gosh-awful looking contraption. 'Preparedness' even climbed up the side of his air shaft and peeped down at the lights of the men below!

"When he climbed down he looks at the crowd around, and says patronizingly, 'That, gentlemen, that is Eeeefficiency!'

"Well, maybe it was, but that night a big wind came along and blew about forty-nine feet of that there shaft over into the next county.

"But at that," sighed Pat, "it wasn't the first shaft sunk on air; a heluva lot of shafts, tunnels and raises have been dug in hotel lobbys, by 'miners' who put in twelve-hour shifts, with never a murmur as to the hardness of their lot."

"Don't you realize, Pat," I asked, when he stopped to light his pipe, "that you are apt to cause great mental anguish among a lot of self-satisfied authorities on mines and mining, if you persist in treading on toes that never turned a hand against you?"

"Disregarding the fact," replied the oracle, "that toes ain't in the habit of turning hands against nobody, I replies to the negative. Don't go getting the idea that Pat Ladigan is a chronic grouch that has done gone sour; he ain't! I am still able to get as many grins per mile on this rocky road of life as the next feller. If more of us humans would quit taking ourselves so ding-donged serious, and try to believe that we ain't each, personally, responsible for the future of humanity—and the Irish—why, we'd be able to forget once in a while how dern important we are. If a feller grins at his own shortcomings, his friends will grin with him, not at him.

"When I was a boy, down in Maine, I used to find a lotta excitement in sticking pins into toy balloons, hopin' I'd find one that wouldn't shrivel up and quit, but I learned that a balloon has to have more than air inside it, or it won't withstand a pin prick. Now; a man—"

"You're getting personal," I objected, "ring off!"

Note.—Pat informs me that "economy means practically the same as economy, but that it sounds more impressive.

IRON PYRITES FOR ROAD SURFACING

During the coming summer there is to be considerable road work done in this section and as we understand it some hard surface road built in the western end of Dolores county and in Montezuma and La Plata counties, says the Rico, Colorado Times. We are told that some of the crushed rock that has been used was shipped from Alamosa and elsewhere. It has seemed to the people of Rico that this is a needless waste of money when a product for hard surface road which is better in every respect than crushed rock, could be had nearer home. This product is pyrites of iron.

This iron has been used around the mines for track ballast, etc., and it has been observed that wherever it is exposed to the air it oxidizes and becomes set and hard, in fact so hard that it cannot be broken with a pick and has to be shot up if the track is taken up or renewed. There also has been some opportunity to observe its ability to stand up under heavy traffic on a grade where the water ran over it in the spring and during the rainy season, and it has never broken up.

It would seem that this iron pyrites is about the best material that could be had for road surfacing as it would last forever and could be had at a very low cost and there is an inexhaustible supply to be had here.

The ore could be mined and placed on the railroad, at a cost of from 75 cents to \$3.50 a ton depending on the amount mined. The cost becoming lower as the tonnage increased. The company owning the largest and most accessible deposits, we understand, is willing to make a very reasonable proposition for the mining of this ore and is anxious to see it used.

It is figured that a six-inch layer of this ore would be more than enough to stand up under the most unfavorable conditions. A ton would cover approximately 290 square feet if used in six-inch layers. Another feature which also would make it desirable is the fact that if the soil underneath the surfacing should be washed out so badly that the top should be broken up from the lack of foundation, the ore soon hardens again, as oxidization would be more rapid at the point of greatest exposure. There would be absolutely no wear out to a road surfaced with iron.

FLOTATION OIL BOOKLET

A booklet giving complete specifications on all Hercules flotation reagents has just been issued by the Naval Stores department of the Hercules Powder Company. In the last chapter methods for testing oils for adulteration are given. This is information which many flotation operators have long desired. It enables the consumer to test flotation oils in his own laboratory.

This booklet, and another one, giving a brief survey of flotation, written by Dr. H. J. Stander, flotation engineer of the Hercules Powder Company, may be obtained without charge by writing to the Hercules Powder Co., Naval Stores Division, Wilmington, Delaware.

Hercules Naval Stores sales offices are situated at Wilmington, Del., Salt Lake City, San Francisco, New York City, Chattanooga, St. Louis, Duluth, Joplin, Mo., and Chicago. All shipments of Hercules flotation oils are guaranteed to conform to specifications which are given in the booklet.

ORES RICH IN COBALT RECENTLY FOUND IN NEVADA-HARMONY MINE

From all reports given out an important strike of cobalt ore has been made at the Nevada Harmony property, four miles east of this city, says the Humboldt Star of Winnemucca, Nevada, March 1. For some time it has been known that the ores contained cobalt, but extensive sampling and analysis made during the past month has proven that the mine contains exceptionally large bodies of this valuable mineral.

This information was given out yesterday by the general manager, George B. Williams, and the extent of the ore bodies now opened in different workings is verified by L. E. Sowers, W. J. Foister, George W. Rheinhardt, Frank Kenney, Chris Diess and Ed Cox, superintendent of the mine.

Ore Bodies Extensive

The main working shaft on the property is now down to a depth of 245 feet and the present work has been going on at the 200-foot level. The north drift on this level is now in the ore body sixty-two feet and the south drift has penetrated the ore for forty-seven feet. In both these workings there are no walls in sight, both faces being in solid ore, and, it has been stated, is of a good commercial value.

The vein that the shaft is following down is over eleven feet wide at the bottom of the shaft. In the north drift a new cross-vein, measuring from eighteen inches to two feet, was cut and what was taken for formation or wall-rock has proven to be all ore. This formation has been designated as a big cross-dyke and is 33 per cent metal and carries a high percentage of cobalt with the other metals.

Up to the present time six cross-veins have been found intersecting the big fissure vein proper in No. 1 shaft, five of which carry good values in gold, silver and copper. The fissure vein itself also carries good values in the three metals.

The fifth cross-vein was encountered at the 108-foot point and it was fifty-five feet before the east rake and downward wall was encountered at the 165-foot point. A hard formation or cross-wall cut into the fissure and when this formation was broken through the new body of ore was opened and continues down to the 245-foot point, which is the bottom of the shaft.

The same kind of ore is opened on the surface for 1200 feet to the northeast and in many places for 200 to 400 feet east along the dyke or intrusion.

The following is an analysis of the Nevada Harmony mine ore at the 200-foot level by L. E. Sowers, chief chemist of the Silver State Chemical Company:

Analysis of the Ore

	Value
Zinc, 1/2 per cent; 10 pounds	\$.45
Copper, 1/2 per cent; 10 pounds	1.25
Iron, 6.25 per cent; 125 pounds	1.25
Manganese dioxide, 10 per cent; 200 pounds	6.00
Arsenic, 10 per cent; 200 pounds	16.00
Cobalt, 8.30 per cent; 166 pounds	498.00
Total value per ton	\$522.95

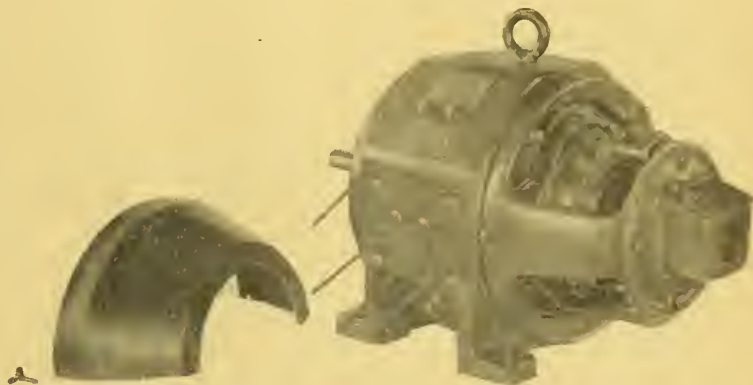
Some picked samples have been run and gave values of \$1500 to the ton in cobalt or over 25 per cent of the mineral. The values are figured at \$3 per pound. The present quotations, said Mr. Sowers, are \$3 to \$3.25 per pound.

NEW LINE OF ELECTRIC MOTORS FOR METAL MINE PUMP SERVICE

The General Electric Company has recently developed a new line of direct current motors, especially built for operating mine pumps. The design and construction of the motors are the result of investigation of conditions under which mine pumps operate, to best meet both the electrical and mechanical requirements of such service.

The motors are built in six different sizes and ratings, but the design and construction are standard for all sizes. They are compound wound with approximately 15% series winding, having four main field and two commutating field poles. All field poles are laminated, and bolted to the frame. The frames are cast steel, octagonal in shape, and provided with a large hole in the bottom for drainage of any water that may accumulate inside the frame. The leads are brought out through heavy insulating bushings to connection plate on the side of the frame. Stamped markings on both the bushings and the connection plate above each lead show the external connections for both directions of rotation.

The motors are not designed to run totally enclosed, but as a protection against dripping water there is a sheet metal top half cover on the commutation end, the end shield on the pinion and being cast solid on top. A new



feature in this motor is the large bearing housings on the end shields, equipped with waste packed bearings. The end shields are complete including brush holders, studs and bearing housings. The latter are interchangeable on all types except one, the 230-volt, which requires larger brushes.

On all sizes except the 550-volt, the brush holder studs are assembled directly on the end shield. The large commutator on the 550-volt motors requires a special bracket, which is fastened to the end shield. Brush shifting is done by turning the whole end shield, the bolt holes being drilled large enough to allow all the rotation necessary. When the proper brush position is determined the end shield is doweled to the frame, and its bolts tightened. The brush holders are specially designed, and so constructed as to prevent chattering, or the rocking of the brushes in the holder.

The armature construction is the same for all sizes except the three smaller, in which the punchings are assembled directly on the shaft, instead of on a sleeve, as in the larger sizes. They all have open slots and form-wound coils, of the pre-heated form-wound type. This type of coil greatly facilitates repair of the armature when that becomes necessary.

Both field coils and armature coils are impregnated with moisture proof compound as a protection from dripping water.

CHIEF CONSOLIDATED REPORT FOR LAST YEAR

Tonnage of ore shipped by the Chief Consolidated Mining Company at Eureka, Utah, and silver produced during 1921 were larger than for any year in the corporation's history, according to the annual report of Cecil Fitch, general manager recently mailed to stockholders.

Development work totaling 7.8 miles or three miles more than was accomplished during the preceding year, was done. Concerning operations of the company Mr. Fitch makes the following report:

"The tonnage produced was 10,837 tons more, and largest in the history of the mine. There was also a record production of silver, being more than 640,000 ounces than in 1920 or more than a half million ounces more than in any former year.

"The average gross value of all ore shows a drop of \$5.40 per ton, which is accounted for by the drop of over 3 cents per pound in the price of lead and something over 8 cents per ounce in silver, as compared with 1920.

"An option for the purchase of the control of the shares of the Grand Central Mining Company was secured by Paul Hilsdale and offered to our company on November 3. After a thorough examination of the property the directors finally approved of the exercise of the option on Jan. 7 and payment was made, the conclusion having been reached that the application of the methods of mining now in practice at our mine will make of this one a profitable operation. Mr. Hilsdale has assumed the direction of the work as superintendent.

"During the last year there has also been acquired control of the shares of the Apex Standard Mining Company, an exploratory enterprise in the southeastern part of the district. This company controls several smaller companies in the same section on the ground of which no work has yet been done.

"In addition, control also has been purchased for our company of the shares of the Eureka Lily Mining Company and the East Tintic Consolidated Mining Company. No work is at present being done on the last named two properties, but on the Apex Standard a shaft is down 900 feet and drifting work is being done on that level.

"The sinking of the Water Lily shaft in the northeastern section of the district has been completed and drifting work commenced. The workings at No. 2 shaft are encountering the same difficulties in the actual finding of the ore channels that are common to all explorations of that kind, even though the work is being carried on in as strong a mineralized zone as that on which the No. 2 shaft was sunk.

"There has been an increased number of ore working points established during the past year and some of these are approaching the anticipated third, or No. 2 shaft zone."

Metal content of the silver-lead ore averaged per ton during the year as follows, according to J. Fred Johnson's report: Gold, .0467 ounces per ton; silver, 34.977 ounces; lead, 16.47 per cent, and copper, 1.32 per cent.

Metal contents of the ore totaled as follows: Gold, 4353 ounces; silver, 3,262,241 ounces; lead, 12,496,433 pounds; copper, 11,563 pounds. Average gross value of the ore per ton was \$41.89; smelting, freight and sampling charges per ton, \$18.65; average net value, \$23.24. Net profits for the year after all charges totaled \$336,998.27.

Assets of the company are listed as: Property, \$2,080,288.12; mine investments, \$398,979.74; current assets, 280,624.87; Liberty Bond investments, \$647,405.04; and cash, \$101,148.35. Total \$3,508,446.12.

Liabilities, capital stock \$884,032; surplus, \$1,827,632.93; current liabilities, \$193,319.65; reserve for taxes and depreciation, \$399,510.42 and \$203,951.12 respectively. Total \$3,508,446.12.

OLD COMSTOCK LODGE OPERATIONS

Since the day, nearly three years ago, when Zeb Kendall and following took over the Consolidated Virginia and the Ophir and started a comprehensive plan of development there has been a revival all along the old Comstock Lode. Since that day some of the biggest mining interests in the United States have been attracted to the old camp. Virginia City itself from practically the remains of a dead mining camp has sprung into new life and is now a busy burg with empty houses filled with paying tenants and a new city is being built on the desert ground of American Flat.

One of the greatest mining projects in the United States is now well under way on American Flat. The Metals Exploration Company through its subsidiary company, the United Comstock Mines Company, has about completed a haulage tunnel 10,000 feet long and rapid progress is being made on a 2500-ton daily capacity mill of the most modern type. According to plans laid fully \$2,000,000 will have been expended on this project before a pound of ore is moved. Bulkeley Wells of Denver is president of the Metals Exploration Company and he has associated with him such men as Harry Payne Whitney, Charles Hayden, of Hayden, Stone & Co., of Boston and New York, Shrove Aldrich of Colorado Springs, and several officials of the Guaranty Trust Co., of New York.

Then comes the Middlemines Company, said to be headed by Charles M. Schwab and his following. They claim to be planning to go the United Comstock Mines one million better and will expend about \$3,000,000 before a wheel is turned in the contemplated mill of 3,000 tons daily capacity.

In a smaller way Herb Humphrey, Frank Manson and others are developing properties on the old lode. Several outside companies that have failed to make good to stockholders in other districts are securing properties in the old camp. The Aladdin Divide has secured a group of four patented claims near the old Monte Cristo mines, while the Spearhead of Goldfield has purchased the Succor and White Lode claims and is now moving machinery to the new property.

It is announced by W. C. Ralston, of Reno, that he will soon resume work at the property of the old Julia Consolidated Mines Company. This was at one time one of the popular stocks on the San Francisco mining exchange. Like many other mines on the Comstock the Julia Consolidated has been idle for several years owing to low price of silver and other reasons. The claims are among the oldest, in point of location on the lode. For many years W. C. Ralston has been in control of the company. According to the old records of the company there is an orebody between the 1550-ft. level and the 2,000 that is nearly 700 feet in length and from 30 to 90-ft. in width.

A Salt Lake agency for one of the largest flotation oil manufacturing companies in the country executed an order early in the month for 12,000 gallons of flotation oil. The purchaser was the Timber Butte Mining Co., of Montana. Business is picking up.

The privilege of being dishonest is often interfered with by a cruel law.

Around the State

The home of Joseph Manwaring, chief clerk of the Utah-Apex, near the mine office, at Bingham, was slightly damaged by a snowslide at an early hour on the morning of the 7th. No one was injured, but the family have moved out, fearing another slide.

W. E. Mendenhall and Paul Ramsey of Lake City, Colo., are in Moab engaged in building two rowboats for their journey down the river to Lee's Ferry. M. W. Morse of Moab, will accompany them on the river trip. The boats are being built on a design to withstand the rapids of Cataract canyon. The aim of the party is to prospect the gravel beds and canyons of the river.

A new high power compressor has just been installed by the Grand Central Mining Company, located at Mammoth. The compressor is driven by electricity and is capable of throwing enough air to supply the entire mine. With the new compressor in use, it is understood that in the near future the lessees will be paid footage and a great deal of development work will take place.

The Bankers' Trust Company was appointed receiver for the Stimpson Equipment Company, dealers in mine and smelter machinery and supplies, on the 7th, by Judge Ephraim Hanson of the Third district court upon the petition of the American Foundry & Machine Company. Judge Hanson issued an order appointing a receiver after he had entered a confessed judgment in favor of the foundry company and against the Stimpson company for \$1,505.57.

Pioneer development work, which is being carried on in the Pinto Iron Mountain district by the Copper Zone Mining Company in its property situated about twelve miles from the Beryl station on the Salt Lake Route and eighteen miles from Lund, has resulted in the opening of a body of very high-grade ore, according to F. A. Kesselhut, consulting engineer. Samples of the ore brought back from the mine by Mr. Kesselhut, have yielded, when assayed, remarkable silver and gold values.

Gratifying conditions prevail in the Emma mine, according to M. M. Johnson, consulting engineer, who returned from the Alta property early in the month. In the raise on the Montezuma fault on the Bay City tunnel level, twenty inches of high-grade ore has been exposed. An average sample of this streak assayed, according to Mr. Johnson, 45.9 per cent lead and 84.4 ounces of silver. Three feet of ore lying on the footwall of this rich streak is of a milling grade. Drifting on the beds for a distance of ten feet to the north is proving the persistence of the deposit.

Stockholders of the Silver Shield Mining and Milling Company, at a special meeting held on the 4th instant, voted to increase the capital stock from 400,000 shares, par value \$1, to 2,000,000 shares, having a par value of 15 cents. A new board of directors, comprising F. H. Bemis, C. W. Hartley, H. S. Joseph, A. T. Sanford, R. E. Miller, A. C. Christensen and J. A. Barclay, was empowered to conduct negotiations for the purchase with treasury stock a property to be operated by the company, which sold its Bingham property to the Bingham Galena company some time ago. It is stated that an option has been taken on the Denver group of claims adjoining the Park Utah and the Ontario Mining companies at Park City.

Conditions in the camps of Little and Big Cottonwood, where real winter prevails, can be summed up as follows: Wasatch Mines is producing regularly without interruption, at the rate of four cars a week. Columbus-Rexall is showing some nice profits on its shipments and has sufficient tonnage developed to insure earnings for at least another year. Michigan-Utah has developed one of the largest, new ore bodies in the camp and will be able to take first rank among the shippers of Alta. Cardiff has already paid large dividends and has a tonnage in sight which practically assures a repetition of its past performance. Alta T. & T. has piled up a nice cash reserve and will be able to make profitable shipments during the open season.

Personal Mention

W. Scott Elliot of Ely, Nevada, was a Salt Lake visitor last week for a few days.

Early in the month George H. Short, mining engineer, made a trip to Idaho Falls, Idaho, on mining business.

J. M. Longyear, Jr., of Marquette, Mich., is now superintendent of the Julieta mine at Jiminez, Chih., Mexico.

E. P. Kipp, district manager of the Hazard Manufacturing Co., of Denver, was a Salt Lake visitor last week.

H. C. Kaufman, of the H. C. Kaufman Co., Los Angeles, was a recent visitor to Salt Lake City, enroute to Denver, Colorado.

F. M. Rapp, mining and civil engineer, formerly of Tonopah, Nevada, has purchased the civil engineering business of Fred Rodoff at Los Vegas, Nevada, and has opened offices at that place.

Roy Moore, general manager of the United Eastern Mining Company, at Oatman, has been elected chairman of the new Kingman chapter of the American Institute of Mining and Metallurgical Engineers.

W. R. Calvert, chief geologist for the Utah Oil Refining Company, has recently been examining mining property in Nevada for California people. On the 5th he left for the coast again on an oil investigating trip.

Walter B. Gates, formerly in charge of the mines of the American Smelting & Refining Company at Sierra Mojada, has been transferred to Chihuahua, where he is looking after the Sierra Mojada unit of the A. S. & R. smelter at Morris.

E. W. Hulse, a well known broker of Nevada and Utah, and also president of the Commonwealth bank, at Greenriver, Utah, died in Peking, China, on February 28th. He was on a trip around the world with Mrs. Hulse when stricken. They left Salt Lake on January 20th.

R. L. Colburn, an old Salt Lake broker who has made his home in San Francisco for many years, where he operates as a member of the San Francisco Stock Exchange, was a visitor in Tonopah and Royston last week. "Dick" made his fortune during the Goldfield boom days.

In Nearby States

ARIZONA

Steam shovels are now busy at the United Verde at Jerome following the churn drilling which was recently completed. There is a tremendous yardage of oxide ore to be removed by the shovels.

Contracts have been let for the concrete work on the new million dollar crushing plant at the United Verde. The machinery order has been placed and it is expected that the contract for 2,000 tons of structural steel will be placed this coming week. The plant is planned to be completed by summer.

It is rumored that the Shea mine, in the Jerome district, is to be taken over by the Calumet & Arizona interests. The Shea development program, which was progressing favorably at the time, was discontinued several months ago. In the event that the property is taken over by the C. & A., it is considered that it will be opened and developed on an extensive scale.

The Black Eagle mine, at Harshaw, which produced a few thousand dollars' worth of silver about two years ago and later fell into litigation, resulting in the lessees giving the property back to its locators, was leased last week to H. H. McCutchan and M. A. Hogan, well-known local mining men, who have begun operations on the property.—Santa Cruz Patagonian.

An option has been taken on the Keystone mine, in the San Francisco district, by Chicago people and the work of unwatering the property is soon to be under way. The property is in the hands of G. S. Holmes and T. H. Fitzgerald, who are said to be the principal shareholders, and they are making possible the rehabilitation of the mines and the sinking of the main shaft to greater depth.

George H. Dowell, manager of the Copper Queen branch of the Phelps Dodge Corporation at Bisbee, recently announced that operations at the mine were beginning with 600 men, all of whom had been kept in the camp on development work during the slump. While it was hoped that an increase in the force might be made in the near future, for the present, Mr. Dowell stated, no additional miners were needed.

Drilling for the giant meteor believed to lie buried in the earth at Coon mountain, 18 miles southwest of Winslow, is being prosecuted steadily by the United States Mining and Smelting Company. A hole has already been drilled over 1,000 feet and it is declared that meteoric fragments have been encountered. Drilling is proceeding on the theory that the meteor went off at an angle after it entered the earth.

BRITISH COLUMBIA

The Standard mine at Silvertown has returned to the shipping list, according to reports. The Standard was acquired under a bond and lease for \$75,000 from the Standard Silver-Lead Company several months ago.

The Florence Silver Mining Company will resume operations on company account on April 1, according to recent

reports at Spokane, Wash. The operations have been in charge of lessees for several months. The property is near Ainsworth, and contains lead-silver ore. It is equipped with a concentrator, tramway and power plant.

The Silversmith mine of the Slocan district made its first shipment this year to the Trail smelter recently. It consisted of 43 tons of concentrates. The Ruth mine, also in the same district, shipped 37 tons; the Wind Pass mine at Chu Chun, shipped 26 tons; the Trail Mining Company shipped 13 tons and 6276 tons were shipped by the Consolidated Mining and Smelting Company of Canada, owner of the smelter.

Resumption of operations of the Leo Mining Company at its Albion property, was discussed at a stockholders' meeting held at Spokane recently. Thomas Hooker, is president and G. W. Roche, secretary, both of Spokane, Wash. D. F. Strobeck of Ainsworth, a stockholder, was in attendance. "Conditions are changing in that district and indications are that the Leo company may be able to become a producer," said Mr. Strobeck. Except for a small amount of work done by the leasers, the property has not been operated for several years.

Completion of a custom zinc plant, now being built by the Consolidated Mining and Smelting Company of Canada at Trail, will mean the reopening of many of the silver-zinc ore mines of the Slocan district, according to reports at hand. The company claims it is impracticable to mix these rich ores with the baser zinc ore from the Sullivan mine, of which 8,000 to 10,000 tons are handled weekly at the company's present plant. The smelter company also is greatly enlarging its lead refinery, which now has a capacity of 90 tons a day and which, with improvements and additions, will be increased to nearly double its present capacity.

Zinc contained in silver-lead-zinc ores will be paid for instead of being penalized as heretofore, according to President J. J. Warren of the Consolidated Mining and Smelting Company of Canada, in an announcement to the associated boards of trade of eastern British Columbia, at Nelson, recently. Explaining how this is possible, he stated the company has sold out all its surplus lead and has been able to reduce the cost of smelting and refining so that it now is not afraid of competition. "The company has found a way to accept shipments of zinc-silver-lead ores and pay shippers a reasonable sum for the metal contents of each ore," he said. "Formerly the zinc operated as a penalty."

Good and bad luck in mining is illustrated by a strike recently reported from the Mountain Chief mine at Renata. The mine was abandoned by J. W. Evans and associates, who took it under bond, after they had spent a long time in exploring it unsuccessfully for ore. A rich ore body was uncovered by the owners soon after they regained possession. Mr. Evans was manager for a syndicate which expended a large sum in a search for ore. When they concluded they were engaged in a hopeless search, they turned the property back to the owners, O. W. Wheeler, Thomas H. Williams, Fred Estey, John McIntyre, E. M. McDaniels and N. McDaniels. These owners put four men to work and almost immediately broke into a body of copper carbonates. It was struck on the 50-foot level, 50 feet from the mouth of the tunnel.

COLORADO

Charles A. Chase, former manager of the Liberty Bell mine at Telluride is now consulting engineer at the Atlas.

The Empress Consolidated people of Empire, are arranging to build a mill at the portal of their tunnel up North Empire gulch near Idaho Springs.

The Jeffrey syndicate that recently took over the Brazil group, in the Idaho Springs district, is preparing to build a road to the property and also to construct a blacksmith shop and bunkhouse, so as to have things in shape to start active operations early in April.

E. C. Condit, well-known Silverton mining man, left recently for Buffalo and Rochester, New York, to spend several weeks attending to mining business. Mr. Condit is secretary and treasurer of the U. S. Mining Company which is planning extensive developments of its Silverton properties this summer.

Charley Olsen, who located an abandoned claim last year, situated in the Freeland district, a short distance east from the old Freeland mine, has opened up a fine streak of high grade lead on his claim, which he calls the Neglected. It is developed by a shaft about thirty feet in depth and a tunnel that has been driven about forty feet.

Billy Gibson, that veteran prospector, and Delmar Morris have opened up a vein of ore on Republican mountain at Georgetown, that bids fair to become a bonanza if the streak is continuous. It is by all means the finest looking ore that has been opened up for many years, and is typical of the ore produced by the Hise, Par, South America and other veins on Republican mountain in early days. The find was made in a tunnel driven by Mr. Gibson in 1874, since which time the walls have caved in, disclosing the ore.

Victor Blanc, a mining engineer and smelter referee of 1709 California Street, Denver, and Frank Barmettler, president of the Publishers Press Room and Bindery Company of 1840 Stout Street, have just returned from a thorough inspection of the Frank J. Hayes mine, located three-quarters of a mile up Virginia Canyon from Idaho Springs, Colorado. Mr. Blanc pronounces the Hayes strike to be a wonderful find of high grade ore in virgin ground, with unlimited possibilities of being a great mine. The vein is a true fissure and assays 12% tellurium, proving the property is located in the high grade Clear Creek, Gilpin and Boulder tellurium belt. One general sample of eight pounds assaying \$1837.80 per ton. The ore carries about 12 per cent lead, which makes the ore premium smelting ore. Mr. Blanc is also making a test for radium and platinum, which he thinks may exist in this already rich ore.

IDAHO

The Pine Creek Mining Company has let a contract for a 100-foot extension of its drift to prove the extent of the ore body. The property is in the Coeur d'Alenes.

A carload of ore averaging \$110 per ton in gold, copper and silver has been shipped from the Bluebird mine at Talache, according to reports received at Spokane.

George Kinmouth, leaser, has shipped his fourth carload of ore from the property of the Big Creek Mining Com-

pany in the Coeur d'Alenes. He reports the ore will run 60 to 70 ounces in silver to the ton.

At the 1500-foot level in the Amazon-Dixie shaft a sump and sink pocket are being sunk and a station cut preparatory to driving a crosscut to the vein, an estimated distance of 500 feet. The property is in the east Coeur d'Alenes.

A considerable showing of ore was recently found in the Independence Lead mine, in the Coeur d'Alenes. According to reports eighteen to twenty feet of milling ore was crosscut, which is said to average 7 per cent lead and two and one-half ounces in silver.

The Independence Lead Mines Company, operating the Independence and Gettysburg groups at Mullan, doubled its working force recently and is now pushing development as fast as possible in the No. 3 tunnel level, according to H. W. Ingalls, superintendent.

Two carloads of ore have been taken from the Success mine, two miles northwest of Wallace, in the Coeur d'Alenes by the leasers, between the 450 and 500 foot levels. They expect it to average more than 40 ounces of silver to the ton, with a corresponding percentage of lead.

An agreement has been entered into whereby the Rex Consolidated Mining Company and the Red Monarch mine, near Wallace, will be consolidated, according to Raymond Guyer. Mr. Guyer represented the Rex and G. I. Toevs the Red Monarch owners. The title of the Red Monarch property will pass to the Rex.

A contract to sink 200 feet to a new low level in the Morning mine in the Coeur d'Alenes has been let by the Federal Mining and Smelting Company, owners of the property. This will give a depth of 2250 feet in the mine and 1450 feet below the main working tunnel and will reach a depth of approximately 1700 feet above sea level.

Commercial ore has been struck in the property of the North Bunker Hill Mining Company, near Wardner, according to reports received at Spokane, Wash. From the bottom of the 500-foot inclined shaft a crosscut was run north, which struck a ledge. This was drifted upon east for about 300 feet, where the ore was found. The vein is reported to show three feet of milling ore of a good grade, next the wall. The North Bunker Hill property lies on the west side of Milo creek.

Alex Ramstedt, auditor of many of the Day mining interests in the Coeur d'Alenes, was recently elected a director of the Tamarack and Custer, taking the place of the late Eugene R. Day. The election was at the annual meeting of stockholders. Jerome J. Day was reelected president and manager. Other directors are: Alex Ramstedt, Wallace, vice-president; Harry L. Day, Berkeley, Cal., secretary; Ramsey M. Walker, Wallace, treasurer; E. H. Knight and F. M. Rothrock, both of Spokane.

The Marsh Mines Consolidated, at Burke, in the Coeur d'Alenes, has drifted 150 feet of the 400 it must proceed to reach the line of its December claim in a run from the Hecla mine, according to Edward Pohlman, president. The work was started at the 30th floor above the No. 3 tunnel of the Hecla at Burke, and is proceeding in a easterly di-

rection on the vein. Ground is being broken at the rate of four to five feet daily, but arrangements are being made for the employment of another shift, when the rate of progress will be doubled.

NEVADA

The Sunbeam Divide lease on the Florence at Goldfield is breaking ore from two faces in its leased ground. Ore chutes and platforms are now completed and continuous shipments will go out for some time.

The Tonopah Extension has declared a dividend of 5c a share payable April 1st to stockholders of record of March 11th. The dividend will amount to \$69,635.72 making a total of \$2,948,000.00 distributed to stockholders.

Trucks are now hauling ore from the Prince Consolidated mine to the depot at Pioche. This ore, which is being mined by lessees from the fissure veins in the upper levels, assays \$5 in gold, twenty-three ounces in silver and 20 per cent in lead.

Herbert Hoover plans visiting Las Vegas and the Boulder Canyon dam site after attending the meeting of the Colorado river commission to be held in Phoenix, Arizona, March 15th, according to a letter received by State Engineer J. G. Scrugham.

The delinquent sale day for Spearhead Gold Mining Company has been postponed to April 18th. A carload of machinery is now loaded at Goldfield awaiting the clearing of roads so that teams may haul the machinery to the new property on its arrival at Virginia City. The Spearhead recently purchased the Succor and other property on the Comstock. Work will begin as soon as the machinery can be gotten to the ground and installed.

A. A. Codd started last week on a ten day trip to the Leadville Mines Company property at Leadville, forty miles from Gerlack on the Western Pacific. From Gerlack he will go in by auto truck taking in a load of distillate. He expected to have to shovel through deep snow a good part of the way. The last few miles will have to be made by horse and sled. The camp was well provisioned before the snowfall but the stock of distillate was low.

The Kernick Divide has levied an assessment of one cent a share. The report of the superintendent shows that 930 feet of shaft has been sunk, 3559 feet of crosscutting and 449 feet of drifting done. All of this work has been done from sale of treasury stock. This is the first assessment on Kernick. While no ore in commercial quantity has been opened several very encouraging values have been had and prospects are said to have never been better in the mine than is showing today.

About one-half the force employed at the Simon Silver-Lead mine quit Wednesday, March 1 when wages were cut. The mill is running part time and there is said to be sufficient ore in bins and on dumps to keep the plant in operation until new forces can be recruited. The new wage scale at the mine is \$4.50 for miners, \$4.00 for muckers and trammers. Board has been reduced \$5 a month. The mine is 20 miles from Mina. The ore trucks of the company were provided with seats and the men who quit were brought to Mina by the company.

At the annual stockholders' meeting of the Virginia-Louise Mining Company, held in Pioche, the following di-

rectors were elected for the ensuing year: J. D. Thomson, N. S. Berray, W. W. Caldwell, C. A. Thompson and Charles Lee Horsey. Dissatisfaction among the bondholders which recently led to the request for the appointment of a receiver for the company was adjusted amicably. Bondholders have agreed to extend the refunding date and, there being no other indebtedness, the matter never was brought into court. The company has a substantial tonnage of developed ore which it is expected to market when smelting conditions warrant the treatment of additional tonnage.

WASHINGTON

After penetrating a mineral-bearing ledge for 40 feet the tunnel of the Chloride Queen in Stevens county broke into rich ore recently, according to Manager Dave E. Zent of Spokane who was at the property. He recently returned to Spokane with samples of silver-lead ore showing native silver and what appears to be gray copper.

A silver-lead strike at the Iron Creek mine, 12 miles north of Keller, is believed to be the richest strike ever made in the San Poil mining district, according to reports received at Spokane. For several days miners had been working on the lead of the new ore body in the lower level of the workings and tapped the lead on the second level. Recently the workmen broke into the main ledge, a perpendicular fissure, which proved to be a bonanza.

Petroleum Notes

Dividends paid by companies belonging to the Standard Oil group in the first quarter of 1922 amounted to \$27,342,227 against \$28,966,611 in the first quarter of 1921 and \$26,796,696 in the same quarter of 1920.

Illipah Petroleum Company is drilling its third hole about 35 miles west of the town of Ely in White Pine county, Nevada. The first hole was lost at 982 feet. The second was junked at 500 feet. Both holes are reported to have had showings of oil and gas. No. 3 is now down about 700 feet.

Ute Petroleum Company and Southern Utah Oil Company are shut down in their joint test in sec. 13-43-6 on the Cline anticline, 6 miles southwest of Duchesne, at 481 feet waiting for new boiler flues. This test has had a number of showings of oil and gas from almost the surface to the present depth.

Operations were resumed at the Utah Oil & Refining Company's well on the Farnham dome early in the month, following the completion of a "fishing" job. The well now is down over 1700 feet and, while both gas and oil stratas have been tapped while sinking to that depth, nothing worth while is expected under 3,000 feet.

The Producers & Refiners Corporation has material on hand at Riverton, Wyoming, for extending its Sand Draw-Riverton gas pipe line to Lander, a distance of approximately 25 miles. Actual construction is being held up awaiting a canvas to determine whether Lander can guarantee sufficient patronage to make its construction pay. A definite decision is expected early in April.

Drilling has been resumed on the Midwest Oil Company test on the McElmo structure, Montezuma county,

Colorado, which was shut down one month ago on top of the Goodrich sand at 3,320 feet. Six-inch casing was set and cemented at 3,140 feet. All arrangements have been completed for bringing in a producer though the exact depth at which the sand will be encountered is not yet certain. The hole is now down about 3,500 feet.

The drillers have returned to the Ohio Oil Company test on 32-28-8, Caineville structure, in Utah, to resume operations as soon as the cement, which was recently placed in the hole at 2,700 feet, is sufficiently hardened. The hole was cemented about one month ago. Completion is expected to follow shortly after operations are resumed. It is understood the company still believes there is a chance to obtain commercial production in this well though results have been discouraging up to date.

A new oil shale investigation, to be conducted at the intermountain experiment station of the Bureau of Mines at Salt Lake City, in cooperation with the University of Utah, has as its object the development of melting point apparatus for oil shale products. It is proposed to develop an accurate method for determining the setting point of shale oils and their products. The investigation will be made by L. C. Karrick, assistant oil shale technologist, with the assistance of F. W. Parry, fellow of the University of Utah.

The Lost Soldier Development Company, composed of business men and bankers of Rawlins, Wyoming, owns the land upon which the Bair Oil Company has most of its producing wells in the Lost Soldier field and about the only business it has to handle is to receive and distribute the royalty checks and these amounted to more than \$50,000 last year. In order to break the monotony, the stockholders have an annual meeting each year and select new officers. They all have to take their turn. This year N. R. Greenfield is president; H. Larsen, vice-president; C. A. Brimmer, secretary; W. A. McKay, J. W. Wisda, R. C. Middlewood and H. Breitenstein, directors.

RICH ORE IN UNCLE SAM

Frank T. Torpey, president of the Eureka Uncle Sam at Eureka, Nevada, has opened an ore body that will provide at least 1000 tons of \$60.00 ore for shipping and a big tonnage for milling when their new mill is completed this spring. Mr. Torpey was called from the coast to Eureka to inspect the new find by a wire from Superintendent States. On his way back to San Francisco he gave out the following statement to a Mining Review representative:

"We have finally struck a fine rich ore deposit and have opened it on three different faces. Assays from these faces show as follows: No. 1, across five feet, gave returns of \$24 gold, 95 ounces silver and 3% lead. No. 2 showed from across one foot \$150 in gold, 85 ounces silver and 4% lead. No. 3 across seven feet gave returns of \$16 gold and 10 ounces in silver. I estimate that we can ship at least 1000 tons of ore from this immediate vicinity that will average better than \$60 a ton and the big tonnage of lower grade will be held for handling in our own mill when completed next spring. We cannot begin hauling for some two weeks owing to the heavy snow fall. We are now stopping on the new ore and Superintendent States and Engineer Rosenshine are both right on the job day and night.

"Our main tunnel is being driven ahead about five feet a day towards the newly purchased old Hamburg ground which yielded so much rich ore in the early days.

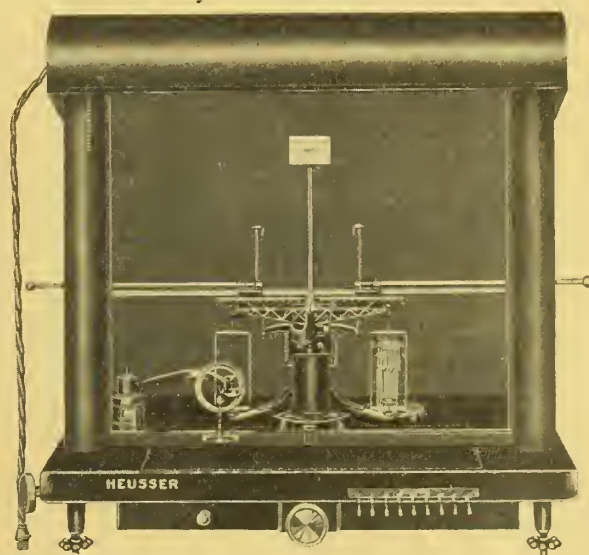
We estimate that there is about 650 feet further to go but it is all virgin ground with great possibilities of opening several more ore bodies on the way in. In fact the day I left we were in a formation that Engineer Rosenshine and Superintendent States considered as very favorable for another ore body similar to the one just cut.

"We now have a splendid equipment with air compressors and every modern appliance within our needs, even to an electric lighting plant that lights not only the camp but mine. The company is now well financed and everything points to a very successful issue of our venture.

"Our new mill is being designed especially for treatment of this quality of ore and we hope to handle at a profit ore as low as six dollars a ton. Engineer Rosenshine has these plans well advanced and much of the equipment is now on the ground. We hope to have the mill running by May next."

PERFECTION IN ASSAY BALANCES

At the present moment the Mine & Smelter Supply Co., is featuring in its advertising the Heusser line of precision balances and scales for assayers, chemists and general laboratory work. The company's latest bulletin No. 65 splendidly illustrates and describes the various groups of these devices which the company carries in stock and which are sold under guarantees that leave nothing for the purchaser to worry about, either when buying or following installation of any one of these units. Now that min-



ing is coming back fast, assayers, chemists and mining companies with assay offices and laboratories attached will be interested in knowing about all the refinements and labor-saving devices that play such an important part in performing perfect work with these up-to-the-minute balances. Study the accompany illustration of one model of the Heusser Precision Balance and then consult the advertisement. After that send to the Mine & Smelter Supply Co. a request for Bulletin 65 and learn all about the sizes, construction and special features embodied in these remarkably perfect balances.

The American Zinc, Lead and Smelting Company has purchased a controlling interest in the Silver Dike Mining Company, whose properties are located near Great Falls, Montana. Including money expended for development work, American Zinc paid approximately \$125,000 for its Silver Dike holdings.

SALT LAKE MINING STOCK QUOTATIONS

The range of the market from February 25th, to March 11th, inclusive. Quotations furnished by J. A. Hogle & Co., direct wires to all leading markets, 169 So. Main St., Salt Lake City, Utah, and ground floor of Eccles Building, Ogden, Utah, and Pocatello, Idaho.

Stock.	CLOSING				Bids.	Asked.	Sales.
	Open.	High.	Low.	L. S.			
Alta Mich. . . . .	.03 $\frac{3}{4}$	.04 $\frac{3}{4}$	.03 $\frac{3}{4}$	.04	.03 $\frac{3}{4}$	.07 $\frac{1}{2}$	11,000
Antelope Star . . .	.07 $\frac{1}{2}$	.07 $\frac{1}{2}$	.06 $\frac{1}{2}$	.06 $\frac{1}{2}$	.06	.07	3,500
Alta Con. . . . .	.07 $\frac{1}{2}$	.07 $\frac{1}{2}$	.06 $\frac{1}{2}$	.06 $\frac{1}{2}$	.06	.07	3,500
Alta Tiger . . . . .	.04	.04	.03 $\frac{3}{4}$	.04	.03	.05	11,000
Am. C. Mines . . . .	.10 $\frac{1}{2}$	.11	.10 $\frac{1}{2}$	.10 $\frac{1}{2}$	.10	.11	3,700
Albion Cons. . . . .	.02 $\frac{1}{2}$	.02 $\frac{1}{2}$	.02	.02 $\frac{1}{2}$	.01 $\frac{3}{4}$	.02	12,000
Am. Metals . . . . .	.16 $\frac{1}{2}$	.17	.14	.14 $\frac{1}{2}$	.14	.15	19,200
Alta Tunnel . . . . .	.03	.03	.03	.03	.02	.03	5,000
Addie . . . . .	.03	.03	.03	.03	.02 $\frac{1}{2}$	.03	5,000
Bullion . . . . .	.03	.03	.03	.03	.04	.07	1,000
Big Hill . . . . .	.03	.03	.03	.03	.04	.07	1,000
Big Cot. Coal . . . .	.03	.03	.03	.03	.04	.07	1,000
Beaver Cop. . . . .	.03	.03	.03	.03	.04	.07	1,000
Bay State . . . . .	.03	.03	.03	.03	.04	.07	1,000
Black Metal . . . . .	.03	.03	.03	.03	.04	.07	1,000
Bingham Gal. . . . .	.03	.03	.03	.03	.04	.07	1,000
Central Eur. . . . .	.03	.03	.03	.03	.04	.07	1,000
Cedar Falls . . . . .	.03	.03	.03	.03	.04	.07	1,000
Colb Rexall . . . . .	.03	.03	.03	.03	.04	.07	1,000
Colorado Con. . . . .	.03	.03	.03	.03	.04	.07	1,000
Crown Point . . . . .	.03	.03	.03	.03	.04	.07	1,000
Cardiff	1.02 $\frac{1}{2}$	1.02 $\frac{1}{2}$	1.00	1.00	1.00	1.02 $\frac{1}{2}$	500
Cott. King . . . . .	.01	.01 $\frac{1}{2}$	.01	.01 $\frac{1}{2}$	.01	.02	4,000
Cott. Metals . . . . .	.01	.01 $\frac{1}{2}$	.01	.01 $\frac{1}{2}$	.01	.02	4,000
Daly . . . . .	.01	.01 $\frac{1}{2}$	.01	.01 $\frac{1}{2}$	.01	.02	4,000
Daly West . . . . .	.01	.01 $\frac{1}{2}$	.01	.01 $\frac{1}{2}$	.01	.02	4,000
Dragon . . . . .	.01	.01 $\frac{1}{2}$	.01	.01 $\frac{1}{2}$	.01	.02	4,000
Demijohn Con. . . . .	.01	.01 $\frac{1}{2}$	.01	.01 $\frac{1}{2}$	.01	.02	4,000
Emma Silver . . . . .	.01	.01 $\frac{1}{2}$	.01	.01 $\frac{1}{2}$	.01	.02	4,000
Empire Mns. . . . .	.03	.03 $\frac{1}{2}$	.03	.03 $\frac{1}{2}$	.03	.04	2,000
East. Prince . . . . .	.03	.03 $\frac{1}{2}$	.03	.03 $\frac{1}{2}$	.03	.04	2,000
E. & B. Bell . . . . .	.03	.03 $\frac{1}{2}$	.03	.03 $\frac{1}{2}$	.03	.04	2,000
Emerald . . . . .	.01	.01	.01	.01	.01	.02	1,000
Eur. Mines . . . . .	.04 $\frac{1}{2}$	.04 $\frac{1}{2}$	.04 $\frac{1}{2}$	.04 $\frac{1}{2}$	.04 $\frac{1}{2}$	.05	1,000
E. Crown Pt. . . . .	.02 $\frac{1}{2}$	.02 $\frac{1}{2}$	.02 $\frac{1}{2}$	.02 $\frac{1}{2}$	.02 $\frac{1}{2}$	.03	1,000
E. Tin. Coal . . . . .	.02 $\frac{1}{2}$	.02 $\frac{1}{2}$	.02 $\frac{1}{2}$	.02 $\frac{1}{2}$	.02 $\frac{1}{2}$	.03	1,000
E. Tin. Con. . . . .	.02 $\frac{1}{2}$	.02 $\frac{1}{2}$	.02 $\frac{1}{2}$	.02 $\frac{1}{2}$	.02 $\frac{1}{2}$	.03	1,000
E. Antelope . . . . .	.02 $\frac{1}{2}$	.02 $\frac{1}{2}$	.02 $\frac{1}{2}$	.02 $\frac{1}{2}$	.02 $\frac{1}{2}$	.03	1,000
Eureka Lily . . . . .	.08	.08	.08	.08	.07 $\frac{3}{4}$	.08 $\frac{1}{2}$	4,000
Eureka Bul. . . . .	.04 $\frac{1}{2}$	.05	.04 $\frac{1}{2}$	.04 $\frac{1}{2}$	.04 $\frac{1}{2}$	.05	19,300
Gold Chain . . . . .	.06	.06	.05 $\frac{1}{2}$	.05 $\frac{1}{2}$	.05	.06	1,500
Grand Cent. . . . .	.44	.45	.42 $\frac{1}{2}$	.45	.46	.51	678
Great Western . . . .	.05 $\frac{1}{2}$	.05 $\frac{1}{2}$	.05 $\frac{1}{2}$	.05 $\frac{1}{2}$	.05 $\frac{1}{2}$	.06	7,900
Hamburg Mns. . . . .	.05 $\frac{1}{2}$	.05 $\frac{1}{2}$	.05 $\frac{1}{2}$	.05 $\frac{1}{2}$	.05 $\frac{1}{2}$	.06	7,900
Howell . . . . .	.05 $\frac{1}{2}$	.05 $\frac{1}{2}$	.05 $\frac{1}{2}$	.05 $\frac{1}{2}$	.05 $\frac{1}{2}$	.06	7,900
Home Run . . . . .	.19	.23	.17	.21	.20	.22	5,225
Iron Blossom . . . . .	.19	.23	.17	.21	.20	.22	5,225
Indian Queen . . . . .	.19	.23	.17	.21	.20	.22	5,225

ORE SHIPMENTS

Ore shipments from the mines of Park City for the two-week period ending on the 10th amounted to 8,285 tons, as follows:

Judge Allied Companies, including Park-Utah	4,327
Ontario Silver Mines	1,555
Silver King Coalition	2,403

Total tons 8,285

During the two-week period ending on the 10th the mines of Tintic forwarded to mills and smelters a total of 262 carloads of ore, as follows:

Chief Consolidated	74
Tintic Standard	85
Colorado Consolidated	21
Eagle & Blue Bell	16
Grand Central	15
Iron Blossom	11
Victoria	14
Centennial-Eureka	6
Swansea Consolidated	7
Alaska	2
Bullion-Peck	3
Dragon Consolidated	1
Gemini	3
Empire Mines	1
Sunbeam	1
Tintic Drain Tunnel	1
Lady Aspinwall	1

Total carloads 262

METAL MARKET QUOTATIONS, MARCH 10th

Silver	99 $\frac{1}{4}$ c
Silver (in London)	33d
Copper (spot)	13 $\frac{1}{2}$ @ 13 $\frac{1}{2}$ c
Lead (New York)	\$4.70 @ 4.80
Spelter (East St. Louis)	\$4.65 @ 4.70

EASTERN STOCK QUOTATIONS, MARCH 10th

Anaconda Copper	48 $\frac{3}{4}$ @ 48 $\frac{3}{4}$
Butte & Superior	25 $\frac{3}{4}$ @ 26
Chino Copper	26 $\frac{3}{4}$ @ 26 $\frac{3}{4}$
Ray Consolidated Copper	14 $\frac{1}{4}$ @ 14 $\frac{1}{4}$
Utah Copper	63 @ 63 $\frac{1}{2}$
Bingham Mines	13 $\frac{1}{2}$ @ 13 $\frac{1}{2}$
Chief Consolidated	3 $\frac{3}{4}$ @ 3 $\frac{3}{4}$
Daly West	2 $\frac{1}{4}$ @ 3
Mason Valley	2 $\frac{1}{4}$ @ 2 $\frac{1}{2}$
Utah Apex	3 $\frac{1}{2}$ @ 3 $\frac{1}{2}$
Utah Consolidated	1 $\frac{7}{8}$ @ 2

DEVELOPED MINE FOR SALE—Copper Belt property of about 100 acres patented, near Lusk, Wyoming. Well developed, thousands of feet of shafts and tunnels, mostly in solid rock. Much ore on dumps. No indebtedness. Clear title in name of former bondholders. \$150,000 has been expended. Will sell for \$25,000. W. A. TITUS, Fond du Lac, Wis.

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ARE WE READY FOR THE SHALE-OIL INDUSTRY?

By J. B. Jenson, Shaloilogist*

We have reached the stage where we must either provide a new source of our present motor fuel or find a substitute for it. A substitute is hardly practical; first because of its cost and second because its adoption will require alteration and adaptation of more than ten million automotive engines already in use in this country. The practical solution of the problem lies in our oil yielding shales. They say we can't treat them in this country. They're fooling you.

The Shales of the West Shall Move the World

By that I mean that the motor fuel coming from shales, both gasoline and the heavier fractions such as are suitable for use in the internal combustion engine, shall eventually become and for generations remain, a universal "world

commodity. Today what is steel without oil? Not a wheel can turn, not an engine produce power and industry must come to a standstill without it.

Coal vs. Oil-Fired Ships

As a comparison in operating costs of coal and oil-fired ships: The Hawaiian American steamer Arizona sailing from Philadelphia via Straits of Megellan to Hawaii and back; fired with coal, time 186 days; with oil 161 days, saving 25 days, 18 days by increased speed and 7 days through quicker bunkering; reduced the number of men in fire-hold from 70 to 10; cost of boarding crew reduced \$4813.00; other expenses reduced \$12,500.00, disbursements of fuel at fueling points \$1000.00 less and \$1275.00 gained from greater cargo space.



Typical Winter Scene in Oil-Shale Fields

power" both for transportation and industrial purposes. The world has reached a stage of development where we cannot do without ample and ever increasing quantities of oil and the nation that has an inexhaustible supply of petroleum products, particularly motor fuel and lubricants, will influence and largely control the future industries of the world. Also the power and influence of these products in time of war was well proven in the late life and death struggle when a victory for the Allies was won very largely through the ability of the American nation to speedily furnish unlimited quantities of gasoline and oils and as one Englishman wisely said, "We literally floated to victory on a sea of oil." The ability to do this was made possible through two things, first the deposition by nature for us of bounteous pools of crude petroleum, second the indomitable scientific and courageous American development of these pools and their conversion into refinery products.

Eighteen to twenty years ago steel was our greatest

In the face of these great differences between coal and oil-fired ships, the U. S. shipping board and also the British shipping board are making their new merchant fleets oil-burners. By the end of 1922 we shall have changed 1,734 coal-burning vessels to oil-burning vessels, and within the next three years we shall require for our merchant marine approximately 90,000,000 barrels of fuel oil per year.

Automobiles Have Increased

One of our greatest requirements of both motor fuel and lubricants is that for our automobiles which within the last 10 years have increased more than 1498%. We had in 1911, 700,000 automobiles and at the end of 1921 there were registered 10,487,617 requiring an average of more than 10 barrels each per year of gasoline. In addition to these there are at least 1,000,000 trucks and many thousand tractors using in conjunction with the 10½ million automobiles, not less than 5,192,402,000 gal. or 123,628,620 bbls. of gasoline per year. It is estimated that there will be over 13,500,000 automobiles in 1923.

There will shortly be a new demand to supply thou-

*An address before the Mining Committee of the Salt Lake Commercial Club and Chamber of Commerce, February 25, 1922.

sands of Diesel type engines which are being substituted for steam power in factories and ships. We are already well familiar with the automotive engine as applied to the aeroplane and automobile and its success as a cheap motive power for transportation, but it is not generally known that today the latest double-acting Diesel type engine develops an efficiency of 4 times that of coal-fired steam engines and $2\frac{1}{2}$ times that of the latest type triple expansion oil-fired steam engine, and when we consider that shale motor fuel produces from 6 to 25% more power than the petroleum products one can imagine the fuel requirement for this class of power within the next few years when our factories shall have either been changed from the old style engine or originally supplied with the new Diesel type engine. This engine is also well adapted to use in ocean going vessels of considerable tonnage as has been demonstrated in the last two or three years in vessels constructed and operated by England.

Navy Requirements

The U. S. Navy consumed approximately 7,200,000 bbls. of fuel oil in 1921 as compared with 6,714,000 bbls. in 1920 and will no doubt soon use oil-driven ships entirely. It has reserved for it, four townships in the Uinta basin of the choicest shale in the entire district which will at no distant day be equipped with plants for the protection of oil for Navy uses, the requirements of which will increase many fold over that of today.

Petroleum Reserves

According to a very careful estimate made by the Geological Survey, supported by a number of our most eminent geologists, we have remaining underground only 9,150,000,000 bbls. of crude petroleum from reserves originally estimated at more than 14,617,000,000 bbls. having already extracted 5,467,000,000 bbls., more than half of which was extracted during the last $7\frac{1}{2}$ years or since the world war began. Assuming that we shall soon be drawing on these stores at an average of at least 600,000,000 bbls. per year this will last not to exceed 15 years.

Are we going to be able to keep ahead of our requirements? It is going to be impossible for us to remove from the ground the 9,150,000,000 bbls. remaining, even if they had been discovered, which they have not and probably will not be, within 20 years. We must therefore augment our present supply by other means and this must begin very soon to prevent a serious shortage. Did you ever stop to think what the condition would be, in your business affairs, if you were suddenly limited to a certain amount of gasoline per day?

Cost to Maintain Wells

As an indication of what is required to maintain production, let me quote Mr. J. C. Donnel, president of the Ohio Oil Co. in speaking to the American Petroleum Institute in Chicago when he said, "that in the Rocky Mountain region 248 structures have been tested at a cost of \$33,000,000, on 41 of which oil or gas has been discovered, representing an expenditure of \$63,000,000, while 207 unsuccessful ventures entailed a net loss of \$20,000,000. These structures were all located by geologists.

"The present daily gross production of the United States is approximately 1,300,000 bbls. and by reason of raising this oil there is a drainage per year of 135,415 acres, so that there must be acquired and operated during the year 1922 a like amount of productive acreage to maintain present production the cost of acquiring which, including royalty, drilling, lifting and wild-cattling will represent a total outlay of \$948,000,000," or nearly \$2.00 per barrel.

England Acquiring Foreign Oils

No one senses more keenly the importance of oil than does Great Britain who is straining every effort to secure control of foreign supplies. At the commencement of the war she controlled 2% of the oil resources of the world. During the brief $7\frac{1}{2}$ years which have lapsed since then, her geologists have penetrated every known land in search of new fields and today she claims that she controls 75% of the world's oil resources and further that America within the next few years will be coming to her for a large portion of her oil supply. The importance of this claim is amplified when we take into consideration the fact, that while the rest of the world contains 7 or 8 times as much oil as remains in underground pools in the United States, it is using only about one quarter as much as is consumed in this country, while the United States and Mexico are drawing on their stores for 87 per cent of the world production, of which probably 67% is drawn from the pools of the United States.

Quoting from an English periodical: "America is running through her stores of domestic oil and is obliged to look abroad for future reserves. These reserves, constituting a key position in international industry, are very largely in British hands or controlled by British capital. Before very long America will have to come to us for petroleum."

Our true policy, therefore, is to encourage investment of British capital in oil enterprises abroad and to see to it by appropriate legislation that the companies so formed remain in perpetuity under British control. In England's fervor, she has overlooked America's great reserves of oil-yielding shales.

New Industries Must Fight for Breath

"But," you say, "I understand there is no known process that will successfully treat our American shales." They are fooling you. As Mr. Jackling recently said, "I don't care a pin about the process. In 1900 there was no known process to treat Utah Copper ores. When we are ready the process is ready."

There was never a great invention brought forth nor an important new industry launched that did not have its "doubting Thomases" its "knockers" and its "foolers" always ready to retard, discourage and prevent development. What a state and what a nation this would be if we were all like these. But, thanks to the red-blooded American who can see beyond the petty dollar that he invests and sometimes even risks, the wheels of industry may continue to turn, and this nation has become the premier nation, to command the respect and admiration of the world.

The shale industry is of more than usual importance and has received more than usual attention from the "foolers." So persistent have they been that some of us have actually come to believe that our American shales are so different from Scotland's shales that they cannot be treated. The telephone, the electric light, the sewing machine and a score of other equally as useful inventions all went through what the shale industry is going through today. It was impossible to get money to establish them until someone with greater vision than the "foolers" provided the necessary funds. Who among us would not now like to be owners in some of the industries that have followed these inventions.

When Isaac Grundy, down in Beaver county, at the instance of Brigham Young, back in the 50's built the first smelter and produced the first lead bullion on the Pacific coast, there were "wise ones" who shook their heads and moaned "it can't be done." Today Utah is one of the greatest smelting centers of the world.

When in the late 70's that stalwart, sterling pioneer, Arthur Stayner, spent his last dollar of hard earned savings to build a little plant at Farmington, near Salt Lake, to make sugar from beets grown in Utah, from seed imported from Germany, not a man would contribute a dollar to help him. They said, "while it might be done in Germany, it can't be done in Utah." The man with greater vision than the "foolers" was President Woodruff, of the Mormon church. Today Utah distributes annually among her farmers more than 10 millions of dollars of sugar beet money and possibly as much more goes to farmers in California, Idaho and Colorado.

Even the great Utah Copper mine had its "foolers" who advised friends "to keep their hands off and save their money." Even Captain De Lamar was given cold feet and demanded his money back when he had paid \$1.00 per share for stock which shortly after this was sold at \$20 per share, and is worth today \$62 per share, after having paid dividends of \$115,000,000. There are many of us who would be wealthy men today if we had followed our own judgment rather than the advice of the "foolers" of Utah Copper.

From 1901 to 1908 millions of dollars were being put into factories to build automobiles and thousands of machines were being put out and purchased against the "fatherly" advice of the "foolers" who freely stated that the automobile could never be made practical or commercial, that it was a fool machine that might take you out but would not bring you back. The industry today gives employment to hundreds of thousands of men, furnishes quick, safe, and cheap transportation—both business and pleasure—for millions of our people and is today the second greatest institution we have. The shale industry will be its big brother within 10 years.

Shale Process is Well Advanced

There are at least two and possibly three processes that will successfully treat our American shales and which have reached that stage of perfection where the industry is farther advanced than was the smelter industry, the sugar industry or the automobile industry when these were launched. Experience from years of Scotland's operation coupled with American engineering and chemical skill, has made this possible.

The latest Utah-developed retort accomplishes what three years ago was considered an impossibility and the time is nearer than most of us believe when great plants comparable with Utah Copper, and treating thousands of tons of shale per day, will be operating throughout the Utah fields, almost at our very doors. As shale products will then augment and be on the market alongside of petroleum products, for convenience in this discussion let us introduce here some new, simple, but distinctive terms.

Distinctive Terms for Shale Products

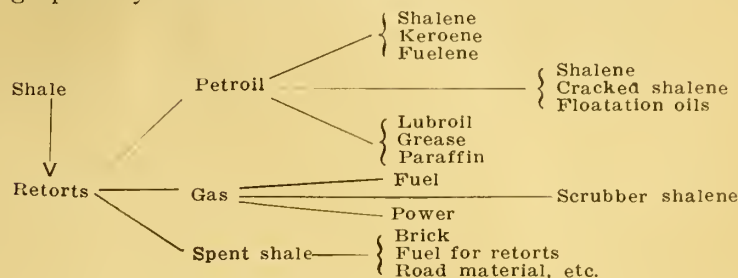
The word "petroleum" from the Greek "petra" (rock) and French "oleum" (oil) means "rock oil," and before Drake discovered oil by drilling in Kentucky in 1859 the term "petroleum" was applied to shale oils. When the products from wells took the place of shale oil it also took the name and after 60 years of continued usage the term has taken on a meaning all its own, and does not in any way suggest oil made from rock but designates the product drawn from oil wells. Unless then we are satisfied to drag along the cumbersome term "shale oil" and the equally cumbersome terms necessary to specify the shale oil products, we must adopt new, distinctive terms. Shale oil is "rock oil" if there is such a product. Let me therefore suggest for it another word which means rock oil as much as "petroleum" does, that of "petroil." This is simple, dis-

tinctive and not to be confused with "petroleum." The products then from petroleum and petroil we may designate as follows:

Petroleum:
Gasoline
Kerosene
Fuel oil
Lubricating oil

Petroil:
Shalene
Keroene
Fuelene
Lubroil

The main and secondary "petroil" products may be graphically illustrated as under:



As to the comparative value of petroleum products and petroil products, I may say that we have made a number of tests in this city with shalene used in automobiles and showing increased mileage of from 6 to 30% over ordinary gasoline. Similar results have been obtained in tests by others both in this country and England. It is a well known fact that the light grade Lubroil is the only satisfactory lubricant for certain types of automobile and by far the best results are obtained in its use in all automobiles in northern Canada during winter months when the extremely low temperature prevails in that country. The product is imported from Scotland and is reported as selling for much higher prices than other lubricating oils. The light Lubroil has also been proven to be one of the most perfect and long-lived lubricants if not indeed the most perfect lubricant for the Ford engine and other engines developing a high temperature on the cylinder walls. It will no doubt some day be as much the "universal" lubricant as the Ford is today the "universal" car. Fuelene also possesses higher heating power than ordinary fuel oil. Three of the main "petroil" products are therefore in every way equal and in some respects superior to similar petroleum products and we may rest assured that the "petroil" products will in every respect hold their own when placed on the market to augment the rapidly decreasing petroleum products.

But, you say, it will require large capital to install plants necessary to supply the declining petroleum. Have we enough accessible shale to warrant the construction of "petroil" plants and with these in operation can we produce "petroil" products at a profit?

To answer the first question I have made a careful estimate of the known shale exposures on privately owned land in the more prominent Utah fields. On these I have computed products contained only in such shales as will aggregate 20 feet in thickness and average a production of 42 gal. or 1 barrel to the ton. There are vastly greater quantities of other shale measures with a lower average and which will be utilized long before the higher grade shales shall have been exhausted. These will at least double the quantity of "petroil" products produced from the 20-foot measure.

Utah Shale Acreage and Products

	Estimated No. of Acres	Averaging 42 gallons	Total bbls. "Petroil"	Averaging 20 to 35 gal.
Soldier Summit	50,000	20 ft.	2,178,000,000	40 ft.
Uinta Basin	125,000	40 to 60 ft.	10,890,000,000	60 to 100 ft.
Watson and				
White River	50,000	30 to 50 ft.	3,267,000,000	40 to 80 ft.
Naval Reserve	92,160	40 ft.	8,016,040,000	60 to 100 ft.
			24,361,040,000	

This gives the munificent amount of 24,361,000,000 gallons of "petroil" to be refined into the marketable "petroil" products, as above indicated. Mr. Winchester has estimated that in Colorado shales over 3 feet thick, there are 20,000,000,000 bbls. or nearly an equal amount to those of the Utah fields. As a guide of what may be produced from this "petroil" production I submit production table taken from "New Shale Industry" and being results in the treatment of 1000 pounds of average Utah shale. This 1000 pounds produced 20.5 gals. "petroil" or at the rate of 40.5 gal. per ton.

Gallons	Gallons half-ton	Value half-ton
Petroil	20.5	
Shalene	1.08	.27
Keroene	2.82	.40
Fuelene	6.45	.47
Light Lubroil	2.37	.82
Med. Lubroil	2.18	.86
Ammonium Sulphate	1.4 lbs.	.07
Shalene from gases	1.2 gals.	.30
Paraffin wax	5.6 lbs.	.85
Residium .....		.56
Product of 1000 lbs.		4.60
One ton		9.20

Cost for mining, retorting, refining, overhead and fixed costs, \$4.38 per ton.
Net profits, \$4.82 per ton, \$209,959.00 per acre \$117,420,000,000.00 in Utah acreage.

For the sake of comparison let us put the valuation per acre into a simple form. It takes 20 cubic feet of the higher grade shales to make 1 ton. Taking then, our 20-foot measure referred to in the Utah acreage, we obtain a ton of shale for each square foot of surface and, as there are 43,560 square feet in one acre, there will necessarily be 43,560 tons of this grade of shale per acre. If there should be but 10 feet in a measure, there will be but half the amount and if the measure be 40 feet thick there will be double the amount obtained in the 20-foot measure. We have therefore a quick, easy way of estimating shale tonnage, when we know the thickness of the vein. Inasmuch as we are basing our calculation, in this instance, on shale that averages 1 bbl. to the ton the number of tons also equals the numbers of bbls.

Value per acre of shale land:

On usual basis of coal at 10c per ton	\$ 4,356.00
On shale basis royalty at \$1.00 per ton	43,560.00
On shale basis production per table above, basis profit \$4.82 per ton	209,959.00

No consideration for by-products except ammonium sulphate. The U. S. Geological Survey estimates that oil land produces an average of 3000 to 5000 barrels petroleum to the acre. Good shale land produces at least 10 times and in some cases 50 times as much "petroil." The "petroil" industry will be the basis for many other allied industries such as fertilizer plants, dye works, zinc reduction plants and scores of manufacturers dependent on oil and gas for their operations. Every citizen of the state should have at least a small interest either in choice shale land or in a reputable shale company as a provision for the future or, as I said a few days ago to a young man who is freely passing his earnings into the movie and other similar channels, "put a little money into shale while you have an income and you will have an income when you haven't any income."

Utah a Producing State

There are great marts of trade where they take from one and give to another and keep all they can. but these are not the empire builders. The things which make the

great community, great state and the great nation are the producers of new wealth—our farms, our mines, our great iron deposits, which will now soon be developed, and steel manufacturers, the sugar industry, the great fertilizer plants the oil wells. These are the things that make an empire. The state that conserves and develops such interests within her borders not only contributes to the needs of her citizens but insures for her future generations, prosperity, progress and wealth.

Utah has become a renowned state. Her mines, smelters and agricultural interests are famed around the world. We point with pride to the greatest copper mine in the world. Suppose this had been more a Utah-owned mine and that its one hundred and fifteen million dollars of dividends had been spent in this community? Who can picture in his mind the conditions; great factories throughout the state; the sky-scrapers and steel plants, the fertilizer plants that would long since have been flourishing, had we had this money to distribute in our community? But our people were wisely advised against mining in the early history of the state. Mining is a hazard. They could not afford to take the risk. They needed the money to develop the farms and to build a commonwealth. We had to call for outside help and it has helped us make of Utah the great state that it is. It has been a wonderful benefit but it has also served to drain our state and to scatter abroad its wealth. The development of mines is a hazard which even now few of our people can afford to take. The development of oil wells is a greater risk and when the ordinary individual undertakes this, he is limited to small means, causing frequent failure. Not so with our great shale ledges wherein is stored one of the elements most necessary to human progress, and which will eventually yield a hundred times more wealth than has been produced from our farms, our sugar factories, and our mines. We shall very shortly see an industry developed within our community—the shale industry—which is greater than all the rest combined.

Seventy-five per cent of the shale land in our state has already been acquired by outside interests, leaving only 25% available to Utah citizens. How much of this shall remain to be distributed as dividends in later years among Utah people? This great coming industry does not contain the hazard of either metal mining or drilling for oil. These great ledges, which can be measured and calculated with precision as to cost, profits and production and which, with the greatest production speed we can possibly exert, cannot be exhausted for generations to come. They do not deteriorate, they do not migrate, they are safer than money in the bank or wheat in the bin. What greater heritage can we leave than some shale? Shall this incalculable wealth be acquired by others while we slumber, and all go to build up other cities and states while our sons, through our neglect, become only sons of toil, receiving therefore the mere pittance that goes for labor and supplies. Let action answer "no."

F. J. Delongchamps, state architect of Nevada, was in Ely a few days ago with plans drawn for the addition to the high school building, which were submitted to the school board and received its hearty approval. The plans provide for the erection of a gymnasium and auditorium on the west side of the present building to seat 400, and a dormitory of equal proportions on the eastern side which will accommodate fifty pupils and ten teachers. The additions to the building will extend the full length of the block with the exception of twenty-five feet on the east.

DRILL SHARPENER POSSIBILITIES IN MANY SIDE LINES OF MINE WORK.

By Letson Balliet, Mining and Metallurgical Engineer.

Mr. Balliet says: "One hundred dollars a day, or more is wasted through most mine blacksmith shops, and much more than that in forge shops and railroad shops. You can sometimes salvage waste material, but you can not salvage wasted motions nor wasted opportunities. You can make another motion in lieu of a wasted motion at you pay for two, where one would have done."

Almost every mine and well developed prospect is today equipped with compressed air, pneumatic drills, and quite frequently with other compressed air tools. A very common compressed air tool is the drill sharpener of the mine blacksmith shop. It is one of the most economic shop tools ever devised, if worked to its best advantage. The early models of drill sharpeners have been replaced with modern designs, so simple that the lowest priced labor on the job can operate them. They are merely an application of **die forging**. The heated steel is placed in a die, while a dolly driven by an air hammer **upsets** the steel in the die. Every bit that comes out of the same die is exactly alike. Any boy who can place the steel in the machine and open the air throttle can make as many bits as the best blacksmith in the world. The actual time required for upsetting a bit is about six seconds. Making new bits, large quarry bits, and starters, of course takes more time. But with the average mine bits it is easily within the capacity of a boy or a laborer to dress from four to six bits a minute, if they are passed from the fire by a "heater boy."

Tempering and heat treating, of course, is another step, and should be. This is best handled in specially designed furnaces.

I can hear a protest from the old-time blacksmiths, because a boy, a laborer or even a girl can sharpen more steel in an hour than the blacksmith could sharpen in a day. Nevertheless the day of specialization has brought out specialists and tools to perform each step of the work. The screw cutting machine is wholly handled by girls; a girl or a boy can feed a bolt-rolling machine that rolls threads on 42 bolts a minute, that the blacksmith used to cut with hand dies, requiring 15 minutes to cut one. The old-time printer would set type of all sizes, run the press, fire the steam boiler, start the engine, lace the belt, read the proofs, make up the forms, solicit advertisements and collect the bills. Today the linotype operator sets the type, and others follow with the other steps.

The matter of sharpening drill bits is a question of equipment and arrangement of the shop.

Mine Drill Sharpener in Shipyards.

When I went into the shipyards during the war, I carried with me many ideas that I had gained around the mines. Some of the work that was being done I saw could be done with a drill sharpener, and I ordered one. When it was delivered at the blacksmith shop of the shipyard, one of the shop-foreman, half sarcastically inquired: "Are you going to sharpen mining steel here?"

"No," I replied, "I'm going to use this machine for upsetting a lot of small things that you buy outside, make by hand, or make in the machine shop, and to work up a lot of scrap and waste material."

There was some skepticism among the blacksmiths, except those who had worked around the mines. That machine brought the mine blacksmiths up to the machine which looked to them like an old friend. It singled out and introduced to me every man in that great shop who had been a mine blacksmith. And I want to say here that for

individuality, loyalty, co-operation, suggestions, ingenuity and resourcefulness the mine blacksmiths could give the city shop men "cards and spades" and beat them at most any work.

The first job that came up was an order for 3240 buttonhead drift bolts, 32 inches long of $\frac{7}{8}$ inch rod. The shop began making them by hand. Heading eight of these bolts an hour was good work for a blacksmith and helper.

I shoved a rush order through the tool-room for a set of dies and a dolly. The dies were simple, merely a straight hole counterbored 1-8 inch, the dolly was simply cupped to make a head of the right size, similar in shape to the head of a carriage bolt.

The dies and dolly were made of ordinary cold-rolled steel. The emergency was so great that I did not have time to forge out blanks from anything else. The tool-room had them ready by noon.

Saved \$728 on First Job.

Picking out a young blacksmith who had worked in a mine shop, I gave him a "heater boy" to heat the rods in an oil fire, and pass them. That afternoon the drill

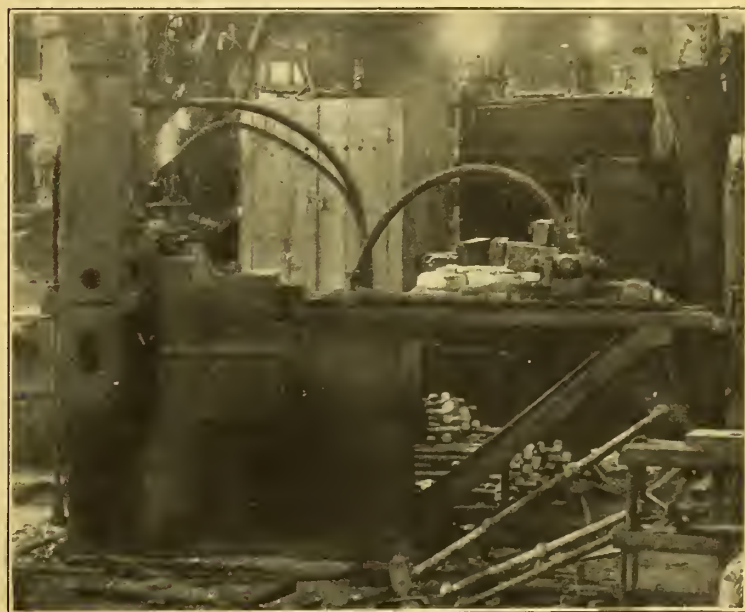


Plate I

sharpener headed 900 bolts and the next day finished the job, every head exactly alike.

At times we held a stop watch on the work. Sometimes the machine made 6, 8, 10 and even 12 a minute and then the "heater boy" would lose a little time filling his furnace. On light work of that kind we later tried two furnaces, and let the heater have a helper to load and tend fires. The drill sharpener saved \$728 on the first job it did, and many thousands of bolts have since been headed with those same dies and dolly, of cold-rolled steel, which are still in good condition.

Although heading bolts with any shaped head is common practice around the mines, I never realized the possibilities of the drill sharpener until emergency made me use it to produce a number of things I had never dreamed of at the mine.

Once there came a demand for wood screws, commonly called lag screws, $\frac{5}{8}$ -8 and 1-2 inches by 8 inches. The war conditions had depleted the store supply and they were unobtainable, so I decided to make them on the drill

sharpeners. I had the die made with the threads and stamped the threads on the screw under the vertical hammer, saving the work of cutting threads. Then I thought how foolish I had been for years for buying lag screws at the mines when I could have made them out of old stripped bolts, hanging rods, and old rods from the scrap pile, at the rate of about five or six a minute, even if I hired a laborer to do it on night shift and discharged the night watchman. There was nothing difficult about it—no tempering. Any boy could pick hot scraps of metal from a fire and lay them in the dies and step on the air.

Next we wanted track spikes. It was easy to square up the rods under the vertical hammer or in the clamp, and just as easy to put on a spike-head as a bolt-head. And again I thought of \$8 per 100 pounds that I had paid for track spikes when I could have produced \$1000 worth from the scrap pile at the mine.

Machine's Broad Field of Usefulness.

By this time the drill sharpener had become recognized as the best paying little machine in the shop, and another one was ordered. With the two machines we had opportunity for further development of its utility. We made

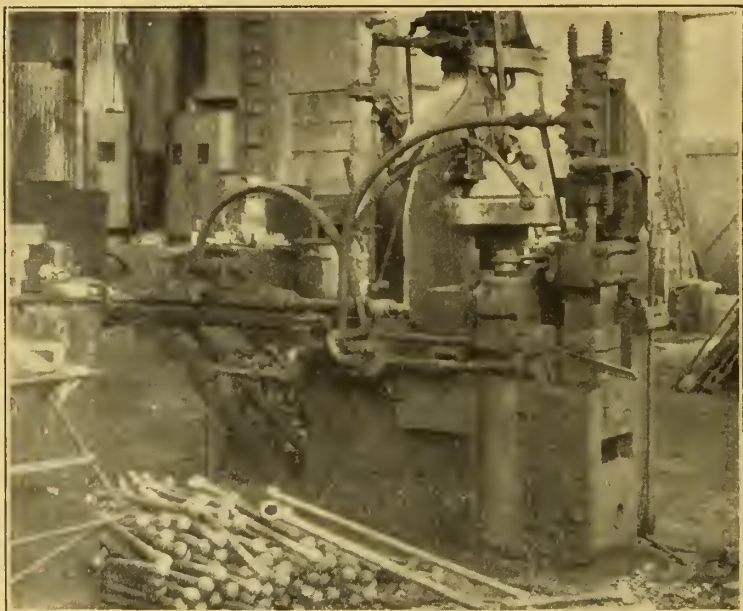


Plate II

boiler patch-bolts, countersunk rivets where the length was greater than the rivet machines would make, rivet heaters, tongs for handling hot rivets, dye-bolts, strap-hinges, large spikes for spiking heavy wharf planking, etc., etc.

As an experiment I made some blank nuts from the steel punchings of boiler plate, and other small scrap. In the shipyard we had too many nuts always, but around a mine it might be very well to know that the drill sharpener can produce them before you can send to town for a supply.

This same machine can be equipped with dies to make it a shear, or a punch. With it you can cut out fish-plates for light mine rail, punch the holes, make your own track bolts, which should be threaded with the usual cut threads. It is easy to chuck the die in a lathe, or on a drill-press or to make a rapid threading machine with a compressed air boring or drilling machine.

After all these little applications, we found that we could make cold shuts, chain links, and put button heads and shanks on rungs for chain ladders, etc.

The usual pipe-hangers, U-bolts, ladder staples and

the like are, of course, common productions of the drill sharpener, but the greatest thing we accomplished was the making of "ball stanchions" for the hand rails.

It is common around mines, to make hand-rails from pipe-fittings with floor flanges. On shipboard they are made from one solid piece, with "balls" upset through which holes are drilled or punched to carry the rail. The balls and the "foot" were made upon the drill sharpener. It was as easy to upset the middle balls as it is to collar a steel for the drill. The only difficulty was that it required more room. To meet this emergency I removed the hammer that came with one of the machines and constructed a bracket in the rear on which I mounted a piston drill with a three-foot feed-screw. This permitted me to make auxiliary dies of most any length and back the machine as far back as was necessary. (See illustration, Plate No. 1.) The three-ball stanchion was made with a ball on the foot, just like the one on the top. Later the foot was flattened into shape under the vertical hammer. (The die used for making one shape of foot is visible in the lower right hand corner of plate 2.)

By looking at these illustrations carefully you will see the easy possibility of working up several tons of scrap drill steel into steel balls for ball and pebble mills at the rate of about five or six a minute, and I wonder why I have bought forged steel balls when I could have made them out of my scrap pile for one-third the cost of the freight.

Of course some one will lay awake all night trying to formulate a reason why all these things are impossible, but they have been done, and done with great economy. We were confronted with skeptics and doubters from the first suggestion we made, but we delivered the goods, and they are laying awake now trying to find out how we did it.

The most wordy opposition came from the skeptics on the question of "tempering," to which I replied: "The machinist who cuts a pinion gear doesn't temper it, nor case-harden it. He cuts it, or shapes it, and that's the end of his job. It is carried to the heat-treating department and receives its required treatment there. That's all I want you blacksmiths to do—shape it—when heat treatment is necessary on cold chisels, chipping-hammer chisels, machinist's hammer, rivet dies, and drill bits, we'll attend to the tempering and heat treatment while you make some more."

Other Economies—Heat-Treating Drill Steel.

Rivet dies are made of harder steel and the upset is so much greater than mine drills, that it required two heats to make the required upset from steel that was small enough for the shank or chuck.

Ordinarily rivet dies are made upon a turret lathe from steel of sufficient size to make the largest diameter, the balance being cut away with the lathe tools. About half the weight of the metal used is cut away, and a machinist can make about forty per day. If blank dies are purchased they cost from \$1.50 to \$2.50 each, according to size and shape. They can be made in a drill sharpener at the rate of about 20 to 30 per hour without any of the metal being cut away. The breakage is far less with upset rivet dies than with machine shop cut dies.

Rivet dies have to be tempered (heat treated) and so should be drill bits. The steel is treated in a muffle furnace with a pyrometer to give exactness of temperature, and every piece comes out alike. Most mine blacksmith shops would save from 50 to 60 per cent of their sharpening if they heat-treated the steel so that it would stay underground when it was sent there. I've made steel stay

a week underground and two or three shifts is common, even in hard rock.

Now, don't blame your blacksmith because he doesn't get such results. He doesn't know what gases are in that furnace fire, nor what they are doing to the steel, nor how hot the steel is, how much carbon he is burning out of it, nor anything else about it, unless you give him a furnace that he can control with a pyrometer, so that he can know the temperature and the proper time to leave it in the heat—and a lot of things you are to blame for yourself.

You expect your blacksmith to look at steel in an open fire and tell you its condition, when the best metallurgical expert would have to analyze it to tell you, and have specially designed furnaces and instruments to get results. What kind of an automobile axle or gear would you expect if you had your blacksmith make it without proper equipment? You'd expect to have broken, battered and worn-away steel parts every few hours, just as the steel comes out of your mine every few hours.

For real extravagance and inefficiency, commend me to the penny-saving, conservative captain of industry who pinches his blacksmith shop, while the miners fight with poor steel.

You think most any old kind of a brick lined box, into which fuel-oil can be squirted, or shoveled, is a furnace, and if you have any sized mine at all it's costing you one hundred or more dollars a day in Wastage.

The railroads also are flagrant wasters in shop practice, but make little attempt to save it.

MILLING PLANTS AT PIOCHE DISCUSSED.

By E. C. D. Marriage.

Without proper milling facilities for a period exceeding twenty years in duration, Pioche today presents an attractive field for future milling operations and that one or more plants will eventually be in active operation now seems to be assured. During this long period and prior to that time mining has developed and made readily available an immense tonnage, variously estimated from 500,000 to over 1,000,000 tons of oxidized gold-silver-lead ore amenable to simple milling practice and of sufficient grade to insure a reasonable profit above all expense.

Every property, and there are many in the Pioche district, possesses dumps and fillings stored underground, assaying from \$8 to \$16 in realizable metal value. Such tonnage could not be profitably shipped but is valuable milling ore and only awaits treatment at suitable plants to enrich the owners of both property and mill. Besides such ore already broken, blocked out tonnages exist in the various underground mine workings, which carry sufficient contained metal value to further pay the cost of mining and transportation to a nearby situated milling plant. Engineers estimate half a million tons of such ore in the properties belonging to the Amalgamated Pioche Mines & Smelters Corporation and allied companies, and a number of other mines have substantial indicated tonnages.

Dr. A. C. Boyle, geologist and mining engineer of the Union Pacific railroad system, in his preliminary report of the Pioche district, recommends the erection of a centrally located power plant to distribute power to the mines and future mills of the district, stating that in his opinion, sufficient tonnage existed to warrant such expenditures.

Other prominent engineers, who have made detailed investigation of mining conditions in the Pioche district have stated that cheaper power and large-scale milling op-

erations are the prime factor in the promotion of the future prosperity of the district for in the mining—profitable mining—of milling tonnage, high grade bonanza ore bodies will again be discovered and shipping ore will be moving simultaneously to the smelters in greater quantity than has been the case for the past fifty years.

ROLLED ZINC IN 1921.

The output of rolled zinc in the United States in 1921 fell off nearly one-half, as shown by reports made to the United States Geological Survey by producers.

The market quotation on rolled zinc, in mill lots at the smelters, at the beginning of 1921 was 11.5 cents a pound, with the usual discounts, but the quotation declined to 8.50 cents a pound at the close of the year.

The notable feature of the year in the rolled zinc industry was the importation of large quantities of sheet zinc, for only a few tons had been imported each year since 1915. From April 1 to June 30, 1922, there was imported and entered for consumption 4,245 tons of sheet zinc, having a declared value at the foreign mills of \$277,830, or 3.27 cents a pound. In the first quarter also the imports were large, but during the last half of the year they were very small. The declared valuation in the last half of the year was larger by 2 to 3 cents a pound, and at the same time the domestic price fell off 3 cents from the price at the beginning of the year, so that at the close of the year the price of American sheets was less than that of the foreign.

Rolled Zinc in the United States for 2 Years	1920	1921
Sheet zinc not over one-tenth inch thick:		
Quantity—pounds	56,812,989	28,580,904
Value	\$6,625,660	\$2,844,406
Average price per pound.....	\$0.117	\$0.100
Boiler plate and sheets over one-tenth inch thick:		
Quantity—pounds	3,950,489	2,545,755
Value	\$402,035	\$192,987
Average price per pound.....	\$0.102	\$0.076
Strip and ribbon zinc:		
Quantity—pounds	45,704,052	29,673,527
Value	\$5,262,538	\$2,902,815
Average price per pound.....	\$0.115	\$0.098
Total rolled zinc—pounds.....	106,457,530	60,800,186
Total value	\$12,290,233	\$5,940,208
Average price per pound.....	\$0.115	\$0.098
Sheet zinc imported and entered for consumption:		
Quantity—pounds	7,572	13,375,245
Value	\$614	\$496,445
Declared value per pound at foreign mills....	\$0.081	\$0.037
Rolled zinc exported:		
Quantity—pounds	23,704,197	3,631,647
Value	\$2,832,993	\$425,618
Average price per pound.....	\$0.12	\$0.117
Available for consumption—pounds.....	82,770,905	70,543,784

Compiled by C. E. Siebenthal and A. Stoll, February 27, 1922.

CADMIUM IN 1921.

Figures obtained from producers by the United States Geological Survey show that the total production of metallic cadmium in 1921 was 65,101 pounds, a decrease of 64,182 pounds, or about 50 per cent, as compared with the production in 1920. On the other hand, the production of cadmium sulphide in 1921 amounted to 65,446 pounds, an increase of 33,313 pounds, or more than 100 per cent, over the production in 1920.

The value of the metallic cadmium produced was \$63,799 and that of the cadmium sulphide was \$71,336, making a total value of \$135,135, as compared with \$188,535 in 1920, a loss of 28 per cent. The average selling price of metallic cadmium in 1921 was 98 cents a pound, as against \$1.17 in 1920, and that of cadmium sulphide was \$1.09 a pound, as against \$1.16 in 1920.

A noteworthy development of the year was the extension of the use of cadmium electroplating for preventing rust.

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*Illustrated.

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ANOTHER MILESTONE TURNED.

With this issue of the Mining Review the twenty-third milestone of its existence has been reached. Through all these years it has consistently worked for the legitimate building up of the mining industry and the men engaged in it. In past periods of depression—and in the boom periods, as well—the Mining Review has kept an even keel, lending encouragement in times of stress and avoiding the sensational when boom conditions were turning the heads of speculators and investors, alike. It has always stood for the legitimate in mining promotion and mine development.

The Mining Review lays no claim to being a technical mining publication, in the accepted meaning of the term. At the same time, its columns are always open to the technical writer when the subjects discussed are educational and germane—when they are of value to the engineering profession and those charged with the conduct of the practical, metallurgical, geological and kindred features of the industry.

Along these lines of publicity the Mining Review claims rank with the best of the world's technical publications; its contributions come from live men who treat of live subjects having to do with modern practice in the business of finding, developing and handling mines and making them yield returns to those who put their money or talents into

them. Because this is so, and because the Mining Review also aims to review the news of the mining districts and keep its patrons in close touch with what is doing all the time, it claims to be a semi-technical mining journal worth while to its subscribers and advertising patrons.

On the front cover of this impression is reproduced a sketch map of the United States and a zone sketch which depicts the central location of Salt Lake City with respect to the surrounding tributary mining districts and regions. The Mining Review circulates in all of these zones and it is taken and read and paid for by men who are all vitally interested in the business of mining, whether engaged in developing mining claims or whether they are managers, engineers, millmen, superintendents, or men who are financing mining undertakings.

They all belong to the class of men in the mining world who do things. The mine developer—and the mining promoter, for that matter—are the mining and milling machinery buyers of tomorrow. They are not necessarily all technical engineers or men particularly interested in highly technical subjects; but, on the whole, they are men who, sooner or later, decide on how properties shall be equipped and operated—and for that reason they are the men who prove worth while to those whose business it is to supply their needs and who can always be reached through the columns of this journal.

These are a few of the reasons why the Mining Review has for 23 years been a recognized entity of value in the mining regions of the West and why it expects to be of ever-increasing value to those engaged in the mining industry through the years to come.

SUSPENDED ANIMATION PERIOD IS ENDED.

With the resumption of operations by the Utah Copper Company within the next few weeks; with assurances that the International company's big smelting works will be going wide open within the next sixty days; with the announcement that Utah Cement company's plants near Ogden and Salt Lake are to cut loose on the 1st; with the Salt Lake Brick Company enlarging its mammoth plant and preparing for a greater output than ever, it may be taken for granted that the period of suspended animation in Utah is at an end.

Word has come from Bingham that 500 men are wanted at once at the Utah-Apex mine. Tintic is now employing more men than for several years and forces are said to be growing larger all the time. What is true of Bingham and Tintic also is true of Park City, the Cottonwoods, Ophir, Marysvale and other Utah camps. The heavy snows of the past winter and the backward, cold beginning of spring, is retarding work in many camps of Utah, Idaho, Nevada and other western mining states, but the next thirty days will find most of them preparing to cut loose. The outlook therefore is that the day is close at hand when there will not be an idle miner, who is willing to work. At the beginning of the year the metal mining industry was running in low gear and at idling speed. The gear-shift has now been moved into intermediate. The first thing we know it will have been moved into high and we shall be traveling at full speed.

Managing Director Daniel C. Jackling of the Utah Copper Company paid a visit of inspection to the properties of the company and left for the Butte & Superior early in the week. He declined to make a positive statement as to when Utah Copper would resume production, though he intimated that it would not be long.

PARK CITY'S BIG MINE MERGER BEING OFFICIALLY WORKED OUT

Details of the big Park City mines merger which were outlined in the Mining Review's February 15th issue are now receiving official verification. In a letter to the stockholders of the Judge Mining & Smelting Company, sent out and signed by the directors of the company—Otto Luedeking, Moylan C. Fox, Adolph G. E. Hanke, Wm. M. Bradley and George W. Lambourne—the capitalization of the new Park City Mining & Smelting Company is given.

While the letter does not give any intimation of what kind of a proposition may be made to other Park City mining concerns to go into the combine, the basis on which the Daly West has gone in and the terms under which Judge Mining & Smelting is invited to enter, are announced. The advantages that are expected to accrue through the merging of companies are set forth in considerable detail and the natural presumption is that it will not be long until other Park City companies, as predicted by the Mining Review a month and half ago, will have received official invitation to go in. Here is the

Full Text of the Letter.

The Park City Mining & Smelting Company was incorporated under the laws of Colorado February 10th, 1922, with a capitalization of \$7,500,000, divided into 1,500,000 shares of non-assessable stock at \$5.00 par value. Colorado was selected as the place of incorporation because, in consequence of recent legislation, it has the laws and regulations most favorable for mining corporations. The new company is authorized, under its charter, to acquire and operate mines, concentrators, reduction plants, smelters, power plants and transportation lines. Its plans include the ultimate acquisition of various properties in the Park City district and their operation on an enlarged scale. The only stock thus far authorized for issue is in exchange for the 250,000 shares of the Daly West Mining Company. The remainder of the new company's stock is un-issued. It is not the intent to use any of it as a bonus or for underwriting or for promotion purposes.

The Daly West Mining Company has already authorized conveyance of its property to the Park City Mining & Smelting Company. When the exchanges of the other stock above indicated are completed, authority will be sought to make sale or conveyance of the properties of the companies concerned to the Park City Mining & Smelting Company.

The benefits to be derived by the stockholders of the Judge Mining & Smelting Company and by the stockholders of the other companies concerned, in the judgment of your directors, would be numerous and should result in a greatly enhanced value to their holdings.

The financial rating of the Park City Mining & Smelting Company will be much greater than the aggregate of the financial ratings of all participating interests, because all operations will be permitted on a co-ordinated and more extensive scale. The new company will have the advantages gained by an organization under the most favorable conditions and under state corporate laws that are most favorable for mining enterprises.

The coalition of interests will eliminate some of the tax burdens and will automatically ameliorate the hardship that has heretofore been imposed on your property as an individual unit, caused by heavy taxation in prosperous years without credit for the adverse years or for the years of excessive prospecting and development that produced that prosperity. It will place your property on a more uniform earning basis and stabilize your investment. It

will result in especially important financial gains to the participating companies because it will permit them to benefit by favorable contracts and agreements now held severally by them. The Park City Mining & Smelting Company will obviously be in a stronger position than your company to make new contracts and agreements because of the added power inherent in large business organizations.

In addition to the above advantages in business administration, other important advantages will be derived from a strictly operating standpoint. It will lower overhead cost. It will bring closer relationship in operation and permit your company to benefit through use of the plants, equipment and underground facilities of other properties. It will permit development and exploration work to become more efficacious and systematic. It will permit purchase of supplies at reduced rates through increased volume of buying.

Present conditions furnish a reason why action should be taken at this time to bring the properties into closer relationship. Market conditions are stable and none of the properties considered is at present on an inflated basis. A sudden disclosure of new ore conditions by any one of the properties might cause inflation and make consummation of the plans impracticable or even impossible.

Your directors believe this is the time for mining companies to put their affairs in the best possible shape to take advantage of future activity in the metal market and to broaden the field for shareholders by making the importance and merit of the Park City mining district better known and better appreciated. It is therefore the intent to list the shares of the Park City Mining & Smelting Company on the Boston and the New York exchanges. The management of the Park City Mining & Smelting Company is in the hands of those who now direct the affairs of the Judge Mining & Smelting Company.

Share Basis of Trade.

The Daly West Mining Company stock will be taken over in exchange for 250,000 shares of the Park City Mining & Smelting Company. The intent is to take over the Judge Mining & Smelting Company stock on the basis of one and one-fifth shares of the Park City Mining & Smelting Company stock for each share of Judge Mining & Smelting Company, this basis representing a valuation of the Judge Mining & Smelting Company equivalent to two and two-fifths times the valuation of the Daly West Mining Company.

Your directors are themselves heavily interested, and also represent the largest stockholders of your company, have themselves individually consented to the same exchange recommended to you, and will exchange their shares in your company, on precisely the same basis as all other stockholders in your company. The holders of the majority of stock in the Judge Mining & Smelting Company have already expressed themselves in favor of the proposed action, and will so exchange their shares, but the directors desire an expression from all shareholders and enclose herewith form and return envelope for that purpose.

It is advantageous to have the transaction completed at an early date and you are requested to make known your wishes promptly. Steel plate certificates of the Park City Mining & Smelting Company acceptable to the Boston Exchange and the New York Curb Exchange are now being made and will be available for issuance about April 15th, 1922. If desired, stockholders may at this time mail their certificates for transfer and receive in exchange certificate for one and one-fifth times as many shares of the Park City Mining & Smelting Company.

TWO NEW MILLS ARE PLANNED FOR MINES IN KATHERINE DISTRICT

By William P. DeWolf.

Kingman, Arizona, March 25.—Development work in the Katherine and the Gold Chain mines in the Katherine district, and in the United American and the Telluride mines of the Oatman district, is demonstrating very clearly their ore-production potentialities and their ore-reduction needs. In each of the properties mentioned the ore bodies are large and well defined and carry lenses of high grade ore of sensational value.

In the Katherine mine the winze below the 400-foot level has a depth of 200 feet, which gives a total depth to the mine of 600 feet. On and above the 400-foot level has a depth of 200 feet, which gives a total depth to the mine of 600 feet. On and above the 400-foot level the tonnage blocked out has a value of \$2,163,000; and the lateral work under way on the first and second levels in the winze will ultimately result in the blocking out of an ore tonnage equal in value to that blocked out above the fourth level. The winze is now being sunk an additional 100 feet and with the reaching of the objective a drive will be run to a point directly beneath the main shaft and a raise run to connection therewith. This work will be followed by the erection of a milling plant of at least 150 tons daily capacity.

The development work in the Gold Chain mine is being done with a view to the erection of an ore-reduction plant of at least 150 tons daily capacity before the close of 1922. The work of completing a station at a depth of 200 feet in the shaft is about completed and will be followed by further sinking to a depth of 300 feet. There a level will be established and crosscuts and drifts run along and through the immense Gold Chain vein. This work will, the management believes, open at least \$1,500,000 worth of ore which, added to the million dollars' worth of ore in sight on and above the 100-foot level, will give the mine an ore tonnage of a gross value of \$2,500,000. Conditions in the workings are very favorable as the ore is higher in value and the gold enrichment more pronounced with increased depth.

Many Properties Making Things Hum.

Twenty-five tons of ore per day are being shipped from the United American property to the Tom Reed mill. The ore has an average value of \$60 a ton and ranges in value from \$40 to \$100 a ton. It is being mined from the stope on the 700-foot level where a $4\frac{1}{2}$ foot lenze shows an abundance of gold in the free. The same character of ore has been opened on the 500-foot level and on the 850-foot level, thereby demonstrating the downward continuation of the ore shoot for nearly 400 feet. The tonnage possibilities offered by a stoping area of this size speak for themselves.

At the Telluride mine the bins are filled to overflowing with ore awaiting reduction opportunity at the Tom Reed mill. It has a general average value of \$22 gold a ton and runs as high as \$100 a ton. Shipments will soon be made daily at the rate of 25 tons. The property is controlled by J. C. McIver and W. K. Ridenour, both of whom have large stock holdings in the United Eastern Company.

Development work of the three Dudley groups, namely, the Oatman Apex, the Oatman Hill Top and the Katherine Treasure Vault, will be well under way by April 1st.

At the Katherine Treasure Vault property, located in the vicinity of the Katherine mine, a plant of machinery will be installed this month. The shaft will be sunk from

its present depth of 50 feet to a depth of 200 feet and there diamond drills will probably be used for testing out the values in the well mineralized Treasure Vault ledge at a much greater depth.

Diamond drills will also be used for prospecting the veins on the Oatman Apex and Oatman Hill Top estates. Each of these properties is on the strike of the immense rhyolitic quartz ore chunnel, which has been tested so satisfactorily in the Oatman United and United American workings. Dudley's plans for development follow the financing of these properties in San Francisco and Los Angeles.

COLEMANITE IN MUDDY MOUNTAINS, NEV.

Deposits of colemanite (hydrous calcium borate), a source of borax and boric acid, have been discovered in two areas in the Muddy Mountains, Clark county, Nev., one in White Basin, the other near Callville, Wash. These deposits are remarkable not only because they are the first valuable deposits of this mineral found outside of California but because the geologic structure of the rocks in which they occur is so simple as to permit a study of the origin of the mineral.

Colemanite was first discovered in this region in the White Basin, east of Muddy Peak, and the first locations were made by John Perkins, of St. Thomas, Nev., in the fall of 1920. Stimulated by this discovery two other prospectors, F. M. Lovell and George Hartman, after a few weeks of clever scientific prospecting, found a much larger deposit near Callville Wash, Nev. They at once sold their claims to F. M. Smith, the pioneer borax operator, for \$250,000.

This deposit lies on the north limb of a downward fold which forms a troughlike depression more than a mile long and nearly a mile wide. The bed or "vein" of colemanite crops out along the steep outer slope of the hog-back ridge formed by the eroded edges of the depressed strata. It is exposed so clearly that from certain points the outcrop is plainly visible for at least 3,000 feet. The bed is a great lens having a thickness in this distance ranging from 10 to 18 feet, and it is especially noteworthy for its continuity and regularity. It is not so thick as some of the enormous deposits at Furnace Creek, Calif., but the deposits there and in all the other producing districts of California are bunched and broken.

The deposits in Nevada, which consist in large part of massive crystalline colemanite, lie near the middle of a set of beds of the Horse Spring formation, at least 150 feet thick, composed chiefly of thin-bedded concretionary limestone. The colemanite is interbedded with considerable shaly material, so that any ordinary method of mining would yield thick masses of the mineral mixed with shale, and it will probably be desirable to concentrate the material by roasting.

The deposit near Callville is apparently similar in origin to the deposits in the White Basin, although it is vastly larger. It appears to be essentially a huge spring deposit formed in or about a playa by the evaporation of waters containing much boron and lime.

All the colemanite in the Muddy Mountains may have been deposited originally as ulexite, a mineral containing sodium, calcium, and boron, but as the waters of the district contain an abundance of lime, as is shown by the enormous masses of trovertine limestone there, most of the colemanite was probably laid down directly from spring waters that contained boron, though ulexite also was probably laid down, for some remains in the deposit.

Around the State

Cement manufacturers of Utah, according to Ralph Bristol, have reduced the price per barrel for their product to the commercial world from \$2.90 to \$2.70, the reduction being effective from March 1.

A recently issued report by the Iron Blossom Mining Company shows that a surplus approximating \$200,000 is on hand. It is expected that a dividend of at least 2 1-2 cents a share will shortly be declared.

Geo. L. Bemis, veteran mining man of Utah, has been appointed managing director of the New Quincy Mining Co., which is actively developing at depth its large Park City holdings, and the adjoining leased Little Bell domain.

L. F. Rains, president of the Carbon Fuel Company, was in Price recently with two or three of his associates that are interested in some coal properties over south of Sunnyside. They made an inspection of these. Utah and California capital will develop the holdings.—Price Sun.

The Utah-Boston Development Company, operating the old New England properties at Bingham, has temporarily discontinued work in the upper levels, pending sinking to deeper levels. Some leases may be granted in some of the old upper workings during the interim.

Following a protracted close-down, during which changes in the methods of milling were made, Senator W. A. Clark's Ophir Hill property, at Ophir, Utah, resumed operations early in the month. Product of the mill, it is said, will go to the International Smelting Company's works at Tooele.

The Silver King Coalition mill has been grinding out concentrates the past two weeks. The machinery started off without a hitch or bobble, much to the satisfaction of Supt. Mathez and Foreman Tallon—as well as to the officials of this great company. From now on there will be a material increase in the output.

The Aluminum Potash Company of America, with headquarters in Salt Lake, has been granted permission by the state securities commission to dispose of 500 shares of its 7 per cent cumulative preferred stock of the par value of \$100 per share. The property of the company is near Winkleman, Piute county, five miles northwest of Marysville.

Rumors of negotiations by Boston interests for several Park City mining properties, located adjacent to the Park-Utah mine, with the intention of a consolidation into one big concern and for the purpose of conducting extensive development operations, were recently announced by Stephen H. Lynch, receiver of the Merchants' bank. He stated that he had received offers for the New York Bonanza mine, owned by Herman Bamberger and himself, and for the Wabash property, on which he and Mr. Bamberger hold an option, but that no definite action would be taken until Mr. Bamberger's return to Salt Lake City from San Diego.

Manager Cecil Fitch of the Chief Consolidated Mining Company announces that preparations are being made for an extensive campaign of development work in behalf of the Plutus territory. During the past few years a large amount of work has been performed in the Plutus ground, being handled from the main workings of the Chief and from the newer workings which are connected with the No. 2 shaft of that company. Mr. Fitch says that this work is to continue and that in addition his company will develop

the Plutus ground from the Grand Central mine, which they recently purchased from Col. C. E. Loose and associates.

The annual report of Dragon Consolidated, controlled by the Knight interests of Provo, shows cash balance of \$20,763.85. The property, located at Tintic, was worked entirely under lease during 1921, the quartz part of the mine being under lease to the Tintic mill and the iron part to the U. S. Smelting company. Recently a sub-lease was given on the talc deposit which surrounds the iron deposit. The quartz lease is yielding 50 tons of ore a day that averages 60 cents gold, 4 ounces silver and 7 per cent copper. Under the iron lease there has been shipped an average of about 75 tons a day that has netted the company 75 cents a ton.

The East Utah Mining Company has filed articles of incorporation with Clarence Cowan, county clerk, and with the secretary of state. The company is capitalized for \$1,000,000, stock having a par value of 10 cents a share. Capital stock is paid for by the transfer to the company of mining claims in the Blue Ledge and Snake Creek district in Wasatch county. R. T. Kimball of Park City is president of the company, W. A. Dennis of Helper is vice president, and W. I. Snyder of Salt Lake is secretary-treasurer. Other incorporators are: J. W. Lamb, Provo; T. H. Paul, Park City; E. L. Jones, Salt Lake; W. D. Sutton, Salt Lake; L. H. Ewell, Provo; J. P. Burns, Park City; William Ratcliff, Provo, and H. J. Dennis, Salt Lake.

DIVIDEND ANNOUNCEMENTS.

Directors of the Tintic Standard Mining company decided to pass the dividend usually paid for the first quarter of the year, according to General Manager E. J. Raddatz.

Dividend No. 2 of ten cents a share, a total disbursement of \$100,000, will be paid by the Park-Utah Mining Company April 1 to stockholder of record March 20. Payment of this dividend will bring the grand total of disbursements of the company up to \$150,000. The initial dividend of five cents a share, or a total of \$50,000 was made December 15, 1921.

A dividend of 3 cents a share was declared on the 18th by directors of the Columbus-Rexall Mining Company. This dividend, a total of \$17,587.05, will be paid April 10 to stockholders of record April 1. When this disbursement is made, the company will have paid a total of \$32,243.08. A dividend of two and a half cents per share was paid by the company December 10, 1918.

EVERYBODY WORKS AT BINGHAM

Dispatch from Bingham on the 24th.—The camp came to life with a start tonight after its sleep of a year, when the word was flashed that "500 men are wanted at once to begin work at the Utah Apex mine." That's the biggest "help wanted" sign that has been hung out in these parts for many a lean month, and the reception which the town gave it spoke for itself. A telegram was received tonight by the operating officials of the mine from R. F. Haffenreffer, Jr., of Boston, the president, and immediately they had the notice flashed on the screens at the moving picture houses. This order means that practically every idle man at present in Bingham will be earning wages in a day or two.

In Nearby States

ARIZONA.

G. T. Colvin, owner of the Bisbee-Sonora mining property in the Paradise district, reports that the Hilltop Extension Company expects to start work on its property in the same district, about the first of April.

The Big Jim Consolidated Company, which has been idle for a couple of years, has started diamond drilling the ledge which traverses the ground. The property joins the Tom Reed and is considered a continuation of the main Tom Reed vein system.

D. C. Nicholson has completed the erection of the gal-lows frame and installation of his hoist. His new camp is nearly completed, and within a short time the Rupert property will begin development upon a substantial scale. P. M. Etchells is supervising the work.—Santa Cruz Patagonian.

A rich strike of gold ore was recently reported from the Lone Wolf group of claims, about ten miles north of Saf-ford. While doing assessment work on the property, which is owned by Turner West and associates, a ledge about two and one-half feet in width was encountered from which samples were taken that assayed as high as \$85 gold a ton.

L. B. Newby is spending today in Kingman attending to business matters, says a recent issue of the Kingman Miner. Mr. Newby, who operated here in 1920, was in Idaho for some time where he made a success on a mining venture and is now operating in Sierra county, California, where he has a property adjoining the Old Sierra Buttes, producer of some \$34,000,000.

W. H. Wise, president of the Gold Dust mine, was in Oatman a few days ago getting actual work started on the Gold Dust. A contract for 5,000 feet of drilling was let to Walter Quinn. Two thousand feet of this work is to be done from the 500 level and 3,000 feet from the surface. The underground work is very important, as it will determine how deep the ledge goes, how wide it is and what values it carries.

COLORADO.

Five to seven feet of ore carrying 20 to 30 ounces silver and 20 to 30 per cent lead is reported in the Rico Wellington at Rico.

At the annual meeting of the stockholders of the Colorado Fuel and Iron Company in Denver on the 20th, Kingdon Gould, son of George J. Gould, was added to the board, as was E. H. Weitzel of Pueblo, general manager of the company. They succeed David H. Taylor and Willard Ward, New York men.

J. P. Ruth & Co. have started the work of constructing a 50-ton flotation mill on Democrat mountain, says the Georgetown Courier. The building will be completed by the time that the road is open for the hauling of machinery. Ruth & Co. have a lease on the two dumps of the Sunburst mine. In addition there are large bodies of low grade ore in the Sunburst and in the mines of the Republican Mines Co. that are ready to be broken and trammed to the mill at a minimum cost.

Incorporation of the Victor Silver Mining company, under the laws of Idaho, has been accomplished to undertake the development of the Bell mine at Montezuma, according to George H. Short, Salt Lake mining engineer.

The property, which is situated about forty-two miles from Leadville, is held by Mr. Short on an option. Stockholders of the new company, practically all of whom are Idaho men, will form the directorate and finance development of the property. The company has been incorporated for \$10,000, divided into 1,000,000 equal shares.

The Contact tunnel of the Midnight Mining Company at Aspen was advanced 145 feet by the contractors during the month of February, about 60 feet in a lime and shale formation, then 40 feet in porphyry when blue lime was encountered, carrying water. The blue lime held for about 12 feet, when a faulted formation of lime, shale and spar was entered. This broken up formation has continued for the last 35 or 40 feet. Supplies have been hauled in to last about two months and a machine drill has been added to the mine equipment. The breast of the tunnel is now entering a promising looking section.

IDAHO.

The Western Union Mining Company, operating near Wallace, in the Coeur d'Alenes, has struck ore in its No. 3 tunnel, according to reports received at Spokane, Wash. The third level is 256 feet higher than the No. 4 on which Kron & Johnson, lessees, opened a large body of high grade ore several weeks ago.

The Lookout Mountain 2200-foot tram on Pine creek in the Coeur d'Alenes is completed and shipments of ore have commenced, according to W. L. Penney, manager. The tram will convey the ore to the wagon road for shipment to the smelter at Kellogg. Another tunnel is being driven, which will give 300 feet additional depth.

The Hecla Mining Company has entered into a new smelter contract with the Bunker Hill Smelter Company. Although the terms of the new contract are not announced it is understood to be one especially favorable to the mining company. The new contract will become effective about July 1 and runs for five years. Under it the Bunker Hill smelter will handle all the ore of the Hecla.

Fred Searls, Jr., of San Francisco, has been in the city the past week on professional business. Mr. Searls is a widely known mining engineer, both in the United States and foreign lands, and has frequently been a visitor in this district. His last engagement in the Coeur d'Alenes was about a year ago, when he made an examination and report on the Hecla mine.—Wallace Miner, 16th.

The Cedar Creek mining property, located a mile and a half from Raven station, on the Prichard Creek railroad, in the Coeur d'Alenes, report stringers of ore found which increased in size and finally merged into a shoot of ore 22 inches wide, practically all of which is shipping grade. A sample of this ore which probably was above the average assayed 63.4 per cent lead, 24 ounces silver, 1 per cent zinc and \$1.62 in gold.

Three concentrators in the Kellogg mining district are resuming operations, according to recent reports. C. L. Hewitt, manager of the Mullan Milling property west of Kellogg, says the 175-ton mill will be started at once. The co-operative mill at Wardner will run this year, with a capacity of 100 tons daily. The Peebles mill at Wardner has resumed and shipped its first carload of product recently to the Bunker Hill smelter.

Snow fall in the Big Wood river section early in March amounted to 35 inches, according to the forestry office. The total depth for the winter was 100.1 inches, with an increase of 7 inches in the last week. This constitutes a

water equivalent of 11.94. The total snowfall up to the same date last year was 84.75 inches, 16 inches less than the present season. The present depth of snow in the Sawtooth forest is: Soldier Creek, 41 inches; Ketchum, 35 inches; Winslow's 35 inches, and Mascot mine, 56 inches.

"There is no surplus of labor in the Coeur d'Alene region," said Donald A. Callahan of Wallace, during a recent visit at Spokane, Wash. Mr. Callahan is a director of the Callahan Zinc-Lead Company and president of the Galena Mining Company. "The Morning mine of the Federal Mining and Smelting company, the Hecla Mining company and the Bunker Hill & Sullivan Mining and Concentrating Company, the three largest in the region, are operating with full complements of men. The total number of men employed on these and other mines is probably 2,000."

The largest mining deal consummated in southern Idaho for many years was closed in Pocatello recently, when the Gold Dredging & Power Corporation, organized by Boise people, took over 5860 acres of rich placer lands in the central Idaho section. The company also took over the equipment of the Boston & Idaho Gold Dredging company, including their power plant on the Payette river, as well as the Centerville Mining & Milling company's holdings on Grimes creek, owned by W. H. Estabrook. The transfer involves property values amounting to \$750,000. The Gold Dredging & Power corporation is capitalized at \$1,500,000, and is sponsored by S. K. Atkinson, Frank E. Johnesse, W. D. Bohm, L. W. Thraillkill and E. G. Eagleson.

MONTANA.

Joseph P. Schmuck, superintendent of the Consolidated Silver-Lead Mining Company's mines on Grouse mountain, eight miles south of Troy, recently exhibited fine samples of lead-silver-copper ore, which he said, were representative of a big ledge five or six feet wide on which they have started a lower working tunnel. This tunnel follows the ledge into the mountain.

Officers have been elected by the Bonita Mining and Milling Company, which has property near Missoula. Mrs. Bertha B. Stiers of Spokane, is director and vice president. Howard J. Johnson of Spokane is a director and others are F. A. Stiers, merchant, Missoula, president; J. M. Stiers, Missoula, treasurer, and E. J. Phillips, St. Paul. "Work will be started in the lower tunnel on one of two claims which the company has recently acquired," said Mr. Johnson. "We will install machinery to enable us to get the ore moving as soon as possible. Assays of our ore have run \$65, \$54.09 and \$98.82 to the ton, chiefly in copper, but with some gold and silver." The Bonita property adjoins the town of Bonita, 25 miles east of Missoula.

NEVADA.

Ben D. Luce, well known silver farmer of Tonopah, has taken a lease upon a block of ground on the C. O. D. claim of the Hudson Mining Company at Royston, and has already insituted development.

C. C. Burger, prominent New York mining engineer, one of the original promoters of the Copper Canyon Mining Company, near Battle Mountain, and for many years interested in Nevada mining affairs, died on the morning of March 10th at the Post-graduate hospital in New York as a result of influenza.

W. J. Tobin, president of the Pioneer Mines Company

at Pioneer, states that the ore in the bottom of the 800-foot shaft is showing values from a few dollars to over \$52 a ton. This is regarded as of great importance to the district, as a barren zone of over 500 feet was passed through before any showing of ore at depth.

James F. O'Brien, mining writer of Nevada, died on the 12th in Oatman, Arizona, from pneumonia following an illness of but a few days. Mr. O'Brien was a native of Springfield, Mass., where he was born on February 3, 1866. He is survived by his wife and two children, Davoren C. O'Brien of Denver and Katherine M. O'Brien of Reno. The family home was in Reno.

The board of directors of the Broken Hills Silver Corporation has sent out notices to stockholders calling a meeting for April 3d. It is for the purpose of reorganizing the company on an assessable basis. Many of the large stockholders have already consented to the plan. On the ousting of George Graham Rice, last summer, from any connection with the company he left it without funds or credit.

That the 300-ton cyanide mill of the Candelaria Mines Co. at Candelaria will be completed in July, in spite of stormy weather that has delayed work, is the statement of C. D. Kaeding, consulting engineer for the company, who recently passed through Reno en route from his San Francisco office to the mine. While some time was lost because of stormy weather, better progress is now being made and lost time will be made up.

Harry P. Layng passed away March 4 at Berkeley, California, from pneumonia after a brief illness, just one week from the day his father died from the same complaint. Harry Layng was a well known metallurgist and for the past two years had worked on a chloride volatilization process for the treatment of lead carbonate ores containing silver and gold. Much of his experimentation work was performed at the Eureka-Holly mine in Eureka.

William Ferris, who has been associated with the Mine Workers Mercantile Company in Tonopah for a long period, and Vivian E. Hughes, well known in mining circles, are in the money. These two residents have concluded a deal whereby they turn over eight placer locations containing great deposits of diatomaceous earth near Basalt in Esmeralda county for a consideration of \$35,000. The purchasers were Posey and Pollard of Los Angeles, and two payments have already been made.

Permit for construction of an electric power line from Great Shoshone Falls to Contact has been issued by the Idaho Power Company to a corporation composed of San Francisco and Oklahoma capitalists, as a result of agreements drafted in Salt Lake City and payment to the company of the initial sum required. On completion of the deal a line will be constructed at a cost of \$150,000 from which it is expected to furnish power and light to Contact for a period of ten years.—Twin Falls Times.

"We have purchased a lot of machinery for our mines," said W. T. McArdle of the Riverside Mining company of Contact, who returned recently from Salt Lake City, "and the shipment will be made from that point to Rogerson. "We expect to haul the machinery out at once and begin installation without delay. We will haul from Rogerson, because the road from Wells will not be open for some months. There is not the slightest doubt about the construction of the Idaho Central railroad from Rogerson to Wells. Men who are on the inside have positive assurance on that point and I am convinced that they are correct."—Elko Free Press.

Personal Mention

General Manager R. C. Gemmell, of the Utah Copper, returned from New York on Tuesday.

E. P. Mathewson arrived in San Francisco on the 13th from a six months' business trip to India.

Dr. L. D. Ricketts and Wm. Thornton, officials of the Inspiration Consolidated, were recent visitors in Miami.

Robert Malcolm is superintending the resumption of operations at the Thumb Butte mine in the Kingman district.

W. A. Wilson, the well known mining engineer, returned from an extended eastern business trip early last week.

M. T. Rowlands, Nampa, Idaho, mining operator, passed through Salt Lake on the 15th en route home after a several weeks' trip to the coast.

J. W. Cairns returned from a winter's stay at his California home on the 15th. He left a few days later for his mining property in Dry Canyon, Tooele county, Utah.

Charles Pugh has been elected president of the newly organized Oatman Mining and Business Men's Association. W. B. Ridenour is vice-president; H. C. Topp, secretary, and W. L. Long, treasurer.

Geo. H. Ryan, general manager of the Midwest Development Company, which is operating the old Miller Hill and other American Fork district property, went out to camp last week to see how work is progressing.

J. A. Egildson, head of the diamond drilling firm of Egildson Bros., of Salt Lake and Rock Springs, Wyoming, left for Wyoming headquarters on the 23rd to look after business matters on that end of the line. He returned Monday.

J. M. Boutwell, formerly geologist in the United States geological survey, and author of the government reports on Bingham and Park City, is now in Salt Lake. He expresses much interest in recent important mining developments in Utah.

E. R. Ramsey, western manager equipment sales department of the Dorr Company, Denver, was a Salt Lake visitor for a day or two last week. Mr. Ramsey has been making a trip through the western mining regions and reports a much improved sentiment with relation to the mining industry. He predicts increased activity from now on.

Petroleum Notes

J. H. Ginnet, inventor of the Ginnet shale process, and president of the Monarch Shale Oil Company, was in Spokane on a business trip in connection with the financing of his enterprises. He reports the widest interest in the north-west in oil shale.

Six solid trainloads of gasoline have been shipped out of Casper for Baton Rouge, La., already this month by the Standard Oil Co. of Indiana, and the company expects to make the total for March, 14 trainloads. The shipments average 60 cars of 10,000 gallons each.—Wyoming Inland Oil Index.

Production from wells on government land in the Cat Creek field in Montana is showing a steady increase, according to settlements made with the land office. Total production under government permits and leases from

August 1, 1921, to January 31, 1922, was 657,244 barrels and royalty amounted to \$64,376.

Carter Oil Co.'s test in Beaver Valley, No. 1 Anna Costlow, sec. 6-42-61, Weston county, Wyo., is shut down on top of the Dakota sand at 3395 ft. with 1800 ft. of water standing in the hole. It is now waiting for more casing to shut this water off and go down to the Dakota sand. The fact that this sand is found in place in this test lends encouragement that the Dakota sand may prove oil bearing.

C. A. Howard, whose arrival in January from the Pacific coast in order to continue to prosecute drilling operations on a well for the Wyoming-Pacific Oil Company in the Fossil field, was in town Monday from the well, accompanied by John Tannehill, who has been assisting in the work for the past three weeks. These gentlemen report having encountered oil in small quantities at a depth of 630 feet, but intend to continue the drilling until a depth of at least 710 feet is reached.—Kemmerer Republican, 17th.

A wildcat well being drilled west of the principal range of the Rockies in Ravalli county, Mont., by the Bitter Root Oil Co., has encountered a good showing of high grade oil at around 1,000 feet and has developed into an important operation. The test is located 1 1-2 miles east of the town of Corvallis on a branch of the Northern Pacific railway running due south from Missoula, and is about 12 miles east of the Idaho boundary. The company drilling the test is composed mostly of local citizens and has approximately 12,000 acres under lease.

The City Council of Rawlins, Wyo., has granted a 25-year gas franchise to the Rocky Mountain Gas Co., which a few weeks ago was given a certificate of convenience and necessity by the Public Service commission of Wyoming for the construction of a gas line from the Mahoney dome to Rawlins. The company proposes not only to deliver the gas at Rawlins but also to put in the distributing system and to furnish it at a rate not to exceed 50 cents per 1,000 feet for the first 100,000 cubic feet and lower rates in proportion to the amount used down to 15 cents per 1,000 feet in wholesale quantities. The Ohio Oil Co. has two large gas wells on Mahoney dome and another is being started.

BUREAU OF MINES CRITICISED.

Editor Salt Lake Mining Review:

Referring to paragraph under above caption on page 16 of your issue for March 15:

Your Nevada correspondent intimates that it is quite impossible for drill bits to become red hot as described in the article in your issue of February 15.

Your correspondent will be interested to know that on the Storm King job on the New York Aqueduct where diamond drilling was done to locate solid ground for the siphon shafts and tunnel the water suddenly stopped in the rods of a diamond drill and although the trained operator immediately shut off the drill, when the rods were hoisted the diamond drill bit had become a molten mass of metal and black diamonds which closely resembled slag.

Your correspondent will also be interested to know that in certain very high grade copper glance the drill bit on 7-8 inch hollow hexagon steel, drilling dry with Jackhammer type machine, has gotten so hot that they resembled a fused mass.

There are no figures of speech used in the above.

Yours very truly,

BURT T. BREWSTER, E. M.
Salt Lake City, Utah, March 15, 1922.

SILVER KING CONSOLIDATED ISSUES REPORT.

Under date of February 25th the annual report of the Silver King Consolidated Mining Company, of Park City, for last year has just recently been printed and mailed to stockholders.

The statement of President Solon Spiro and the report of Consulting Engineer Harry A. Lee completely cover the year's operations and explain the present physical condition of the property and the work of development that is progressing. A complete financial statement accompanies the report.

From President Spiro's report the following excerpts are taken:

"During the year the Spiro tunnel was driven 904 feet, making the total length on January 1, 1922, 15,014 feet. Prospect work was carried on from the No. 1 raise, which is nearest the portal of the tunnel, to the "Big" dike, covering a linear distance of 1550 feet along the tunnel.

"The work in the tunnel completely verifies the fact that its territory is, geologically, a continuation of the section from which our company has mined two and a quarter million and a neighbor has produced more than thirty million dollars' worth of ore. In this formation the ore does not make continuously in fissures, but occurs at irregular intervals as huge disconnected masses that must be located by systematic development work such as we are now doing in the limestone horizon.

"The last 500 feet of the Spiro tunnel is in our California-Comstock group of claims and the tunnel breast is underneath the Comstock workings. A body of good concentrating ore has been demonstrated on the 250-foot level of the Comstock. The connection of the Comstock shaft, 450 feet deep, with the tunnel, 1250 feet deeper, will permit the economical extraction and treatment of this ore and the mining of other beddings, probably of high-grade ore, which should be opened in making the connection.

"It is hardly necessary to say that securities of every description have been at a terrific discount during the year just closed. This made it impossible to refund our note issue or to market other debentures except at a severe sacrifice. In view of the conditions prevailing a number of the larger note-holders proposed that the notes and interest due be made convertible into stock at \$1.50 instead of \$2.00 per share, the maturity extended for one year and assessments credited thereon at the pleasure of the holders. The plan was accepted by the board of directors.

"To meet operating expenses and certain bank obligations three assessments of ten cents each were levied. Forty-eight per cent of the assessments were paid by persons owning 5,000 or more shares and about 34 per cent by officers of the company and their families. The greater part of the receipts were applied on the liabilities of the company and it is gratifying to find that during a year of such unprecedented financial stringency we not only financed the completion of our tunnel and the raises to the ore horizon, but also reduced our fixed obligations by \$175,769.26. The accompanying financial statement covers these matters."

PROMINENT OIL SHALE MAN DIES

Telegraphic news from Grand Junction on the 22nd brought the information that J. H. Galloupe had succumbed to an attack of combined influenza and pneumonia.

Mr. Galloupe was fifty years of age. For several years he had been devoting his time and talents to the invention, building and installing plants for the treatment

of oil-yielding shales. He had perfected and placed in commission a successful plant in Montana and another near Watson, in the Uinta Basin country, Utah, for the D. J. L. Davis interests. It is understood here that he went back to Colorado two or three months ago with a purpose of making arrangements and accumulating materials for the enlargement of the Uinta Basin works.

Mr. Galloupe was well known in Colorado as a result of years of residence there, and he was also well known in Utah, Montana and California oil and oil-shale circles as a result of his work in perfecting methods of treating oil-shale rock.

In his death the oil-shale industry loses a worthy champion and intelligent, conscientious worker. He leaves a wife and one son, and a host of personal friends and admirers, to mourn his sudden demise.

GREAT GATHERING OF ENGINEERS

As a fitting finale to nearly a week of business and social gatherings, members of the Utah and Idaho Engineering Councils tendered a banquet Monday evening at the Hotel Utah to Herbert C. Hoover, commerce commissioner; A. P. Davis, director of the reclamation service and other distinguished guests who had come to Salt Lake City primarily for the purpose of discussing features of the Colorado river project. Secretary Hoover received an ovation at the hands of the engineering fraternity when introduced by H. T. Plumb, chairman of the state engineering council and enthusiastic good fellowship pervaded the atmosphere from start to finish.

During his remarks Secretary Hoover laid much stress on the reliance that must be placed on the engineering profession in working out governmental problems in many lines and among other vital points touched upon, he declared that the solution of the interstate problem of the Colorado river project would be made on the basis of engineering facts rather than upon legal interpretation of interstate rights.

Director A. P. Davis, of the reclamation service, made a powerful plea for the Colorado project, while a number of other delegates to the conference on the project which had been held in the city during the previous few days, made snappy, two-minute talks.

It was a great gathering and the Utah Society of Engineers and their co-workers everywhere are sure to feel the benefits of the get-together sentiment that characterized the gathering at which 600 or more participated.

MINING MEN TO MEET AT PARK CITY.

Tentative arrangements were made on the 24th to hold the second meeting of the Utah Metal Mining Institute at Park City, July 14 and 15. This decision was reached at a meeting of the executive committee in the offices of the Utah chapter of the American Mining Congress. Member of the committee present were A. S. Winther and E. A. Hamilton of Bingham, H. M. Hartman of Ophir, Forrest Mathez and O. N. Friendly of Park City, T. P. Billings of Tintic, C. A. Allen, Ernest Gayford, N. A. Robertson and A. G. Mackenzie of Salt Lake.

The committee, which was appointed at the first meeting of the institute here last October, decided to have two meetings of the institute this year. The first will be held at Park City on the dates indicated and will be devoted to inspection of the properties there. The second will be held later in the year at Salt Lake City and will include papers and discussions.

SALT LAKE MINING STOCK QUOTATIONS

The range of the market from March 13th, to March 24th, inclusive, Quotations furnished by J. A. Hogle & Co., direct wires to all leading markets, 169 So. Main St., Salt Lake City, Utah, and ground floor of Eccles Building, Ogden, Utah, and Pocatello, Idaho.

Stock.	CLOSING				CLOSING			
	Open.	High.	Low.	L. S.	Bid.	Asked.	Sales.	
Alta Mich.					.03½	.07½		
Antelope Star					@			
Alta Con.	.05½	.06	.05½	.06	.05	.06	1,500	
Alta Tiger					@			
Am. C. Mines.	.04	.04	.03½	.03½	.03½	.03½	15,200	
Albion Cons.	.10	.10	.10	.10	.10	.10½	400	
Am. Metals	.02	.02	.02	.02	.01½	.02½	2,000	
Alta Tun.	.14	.14½	.13	.14½	.14	.14½	15,500	
Addie					.01½	.25		
Bullion	.02½	.02½	.02	.02	.02	.03	1,600	
Big Hill					.02½	.03		
Big Cot Coal.	.05½	.05½	.05½	.05½	.04½	.06	9,000	
Beaver Cop.								
Bay State					.01	.03½		
Black Metals	.11	.11	.10	.10	.08	.12	2,500	
Bingham Gal.							25,000	
Cent. Eureka						.02		
Cedar Talis.					@	.01	1,000	
Colb Rexall	.29	.35	.29	.33	.33	.34½	9,400	
Colorado Con.	.04	.04½	.04	.04½	.04	.05	4,200	
Crown Point	.02	.02	.02	.02	.01½	.02	4,000	
Cardiff	1.00	1.00	1.00	1.00	.95	1.00	100	
Croff					@	.01		
Cott King	.02	.02	.01½	.01½	.01	.01½	12,000	
Cott. Metals								
Daly					1.60	3.00		
Daly West					2.40	3.00		
Dragon					.05			
Demijohn Con.					@	.01		
Emma Silver	.02	.02½	.01½	.01½	.01½	.02	81,600	
Empire Mns.	.04	.04	.04	.04	.03	.04	500	
East. Prince					@	.01		
E. & B. Bell					2.35			
Emerald						.03		
Eureka Mns.	.04½	.04½	.04½	.04½	.04½	.05	1,000	
E. Crown Pt.	.02½	.02½	.02½	.02½	.02½	.02½	6,000	
E. Tin Coal.						.01	1,000	
E. Tin. Con.					@	.09		
East Antelope					@	.02		
Eureka Lily	.08	.08	.08	.08	.08	.08½	7,000	
Eureka Bul.	.04½	.04½	.04½	.04½	.04½	.05	10,000	
Gold Chain	.05½	.05½	.05½	.05½	.05	.06	2,000	
Grand Central	.46	.52	.46	.48	.53	.75	700	
Great Western					.01	.04		
Hamburg Mns.					@			
Howell	.05½	.06½	.05½	.06½	.06½	.06½	10,614	
Home Run					@			
Iron Blossom	.21	.23	.21	.21	.20	.22	9,200	
Indian Queen					@			
Iron King	.05½	.05½	.05½	.05½	.05	.07½	6,400	
Judge M. S.	2.60	3.00	2.50	3.00	2.85	3.00	450	
Keystone					.10			
Kennebec					.06	.08		
Lehi Tin.	.02½	.02½	.02½	.02½	.02½	.03	31,000	
Leonora	.01	.01½	.01	.01½	.01	.01½	2,500	
Lynn Big Six					.12	.23		
Mont. Bing.	.07	.07	.06½	.06½	.06	.08	2,000	
Monzonite					@			
Mammoth					.15			
Miller Hill					@	.02		
May Day	.01	.01	.01	.01	@	.02	2,000	
Mason Valley					1.50			
Moscow					@	.10		
Michigan Utah	.29	.29	.25½	.27½	.27	.28	20,925	
New Quincy	.05½	.07½	.05½	.06½	.06½	.07	40,220	
Naildriver					@	.35		
Neva					@	.04		
North Stand.	.05½	.06½	.04½	.06½	.06	.06½	52,100	
O. K. Silver						.02		
Ophongo					@			
Plutus					.16			
Prince Con.	.08	.09½	.07½	.09	.08½	.09½	28,700	
Paloma								
Pioche Bristol						.01	2,000	
Price Mining					.04	.05½		
Provo	.02½	.02½	.02½	.02½	.02½	.03	1,000	
Reeds Pk. C.					.01	.02		
Rico Well					.02			
So. Standard					.10	.12		
Sells	.02½	.02½	.02½	.02½	.02½	.03	3,500	
Syndicate								
Sil. King Coal	2.25	2.25	2.17½	2.17½	2.12½	2.20	1,540	
Sil. King Con.	.45	.45	.37	.37	.38	.44	500	
Sioux Mns.	.01½	.01½	.01½	.01½	.01½	.02	3,000	
Swansea Con.					.01	.01½		
Silver Shield	.02	.02	.02	.02	.02	.02½	1,000	
Tecoma								
Tar Baby	.02½	.02½	.02½	.02½	.02	.02½	3,000	
Tintic Central					.01	.01½		
Tintic Stand.	1.97½	2.05	1.82½	2.05	2.02½	2.05	12,714	
Uncle Sam							5,000	
Utah Con.					@	.01	5,000	
Union Chief					@	.04		
Victor Con.								
Victor Mng.	.02	.02	.01½	.02	.01	.02½	3,000	
West Toledo	.03	.03	.03	.03	@	.03	7,500	
Walker Mng.	3.00	3.00	2.90	2.90	2.82½	2.90	900	
Woodlawn	.08½	.08½	.08½	.08½	.07		2,000	
Yankee Con.					.02			
Zuma	.08½	.08½	.08	.08	.07½	.08	6,700	

METAL MARKET QUOTATIONS, MARCH 25th

Silver	.99½c
Silver (in London)	.33½d
Copper (spot)	.13@13½c
Lead (New York)	\$.47@\$.48
Spelter (East St. Louis)	\$.47@\$.475

EASTERN STOCK QUOTATIONS, MARCH 25th

Anaconda Copper	.50½@.51
Butte & Superior	.26
Chino Copper	.26½@.27½
Ray Consolidated Copper	.14½@.14½
Utah Copper	.63½@.63½
Bingham Mines	.13½@.14
Chief Consolidated	.3½@.4
Daly West	.2@.2½
Mason Valley	.1½@.13½
Utah Apex	.3½@.3½
Utah Consolidated	.1½@.2½

ASSESSMENTS PENDING

Eureka Bullion, ½c. a share. Delinquent March 18. Sale day April 5.	
Bingham-Galena, 1c. a share. Delinquent April 14. Sale day May 22.	
Crown Point, 1c. a share. Delinquent April 14. Sale day May 10.	
Louise Mining Company, 1c. per share. Delinquent April 20. Sale day May 20.	
Utana Mining Corporation, 1c. a share. Delinquent April 25. Sale day May 15.	
Silver King Consolidated, 10c. a share. Delinquent April 22. Sale day May 16.	
Mutual Metal Mines Company, ½c. a share. Delinquent April 3. Sale day April 25.	
Emerald Mining Company, 1c. a share in three installments. Delinquent March 15, April 15 and May 15. Sale dates April 15, May 15 and June 15.	
Zuma Mining Company, 1c. a share. Delinquent April 17. Sale day May 10.	

ORE SHIPMENTS

During the two weeks ending on the 24th the mines of Park City shipped 5,035 tons of ore, as follows:

Judge Allied Companies	2,812
Ontario Silver Mines	1,002
Silver King Coalition	1,251
Total tons	5,035

Fifteen mines of the Tintic district shipped to the mills and smelters 308 carloads of ore, as follows:

Tintic Standard	86
Chief Consolidated	77
Colorado Consolidated	28
Eagle & Blue Bell	26
Victoria	34
Iron Blossom	24
Swansea Consolidated	10
Grand Central	5
Gemini	6
Centennial-Eureka	6
Bullion-Beck	2
Sunbeam	1
Mammoth	1
Showers Consolidated	1
Eureka Mines	1
Total carloads	308

H. V. Chase, who has for several years past been the superintendent of the Bacchus plant of the Hercules Powder company, has been transferred to the Ishpeming, Mich., plant of the corporation. Mr. Chase will act as assistant superintendent of the Michigan plant. It is probable that the Bacchus plant, according to information received at the local office, will in the near future be operated for several months in the making of black powder.



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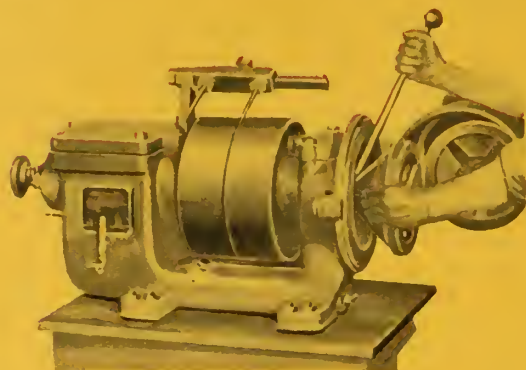
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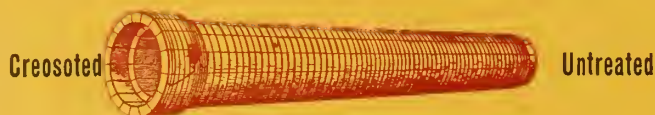
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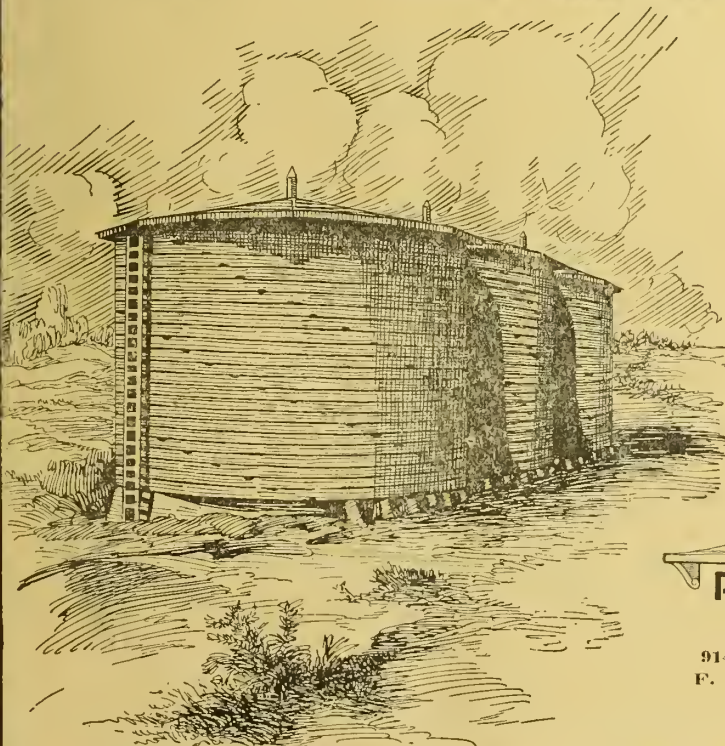
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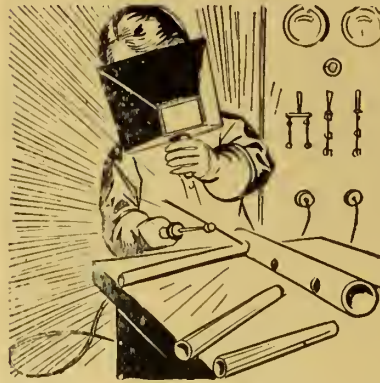
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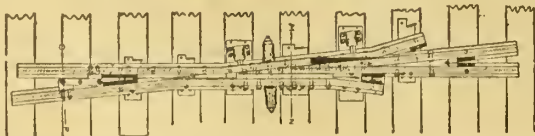
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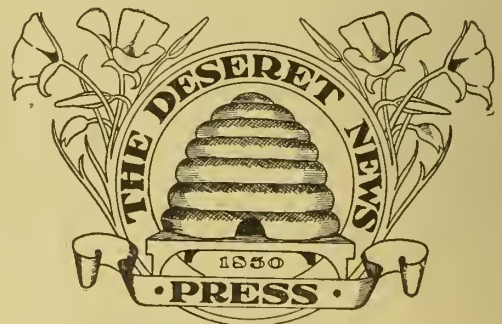
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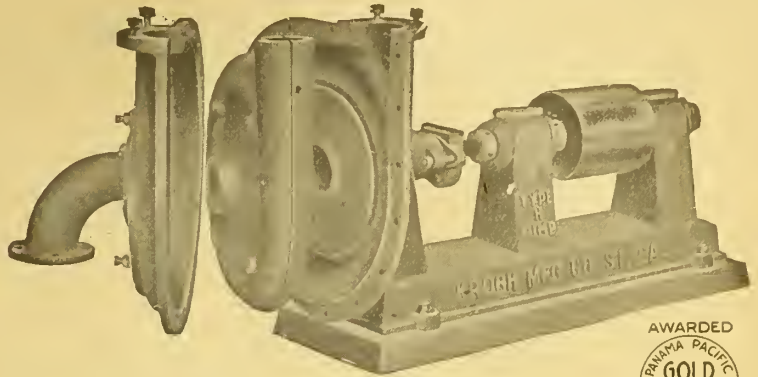
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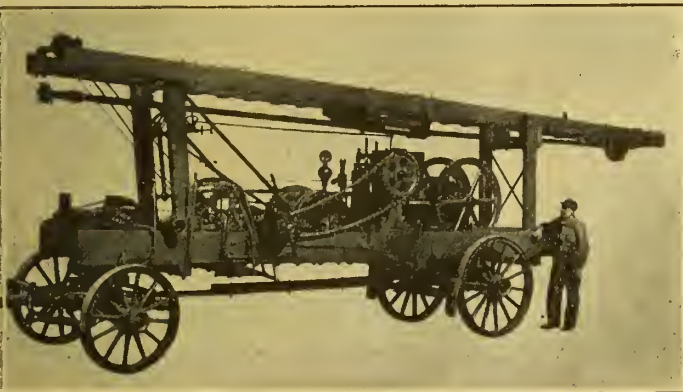
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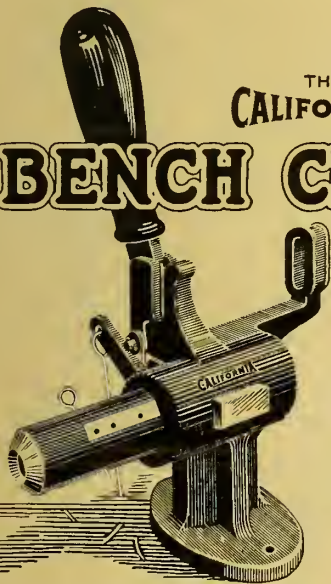
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vice-president and general manager, Eureka, Utah; Thomas Carmichael, secretary-treasurer, Salt Lake City, Utah; J. Fred Johnson, general superintendent, Eureka, Utah; Paul Hinsdale, superintendent, Eureka, Utah; Bert L. Cripps, accountant, 814 Newhouse Bldg., Salt Lake City, Utah. Directors: Walter Fitch, Sr., Eureka, Utah; Cecil Fitch, Eureka, Utah; Wm. Pischel, Salt Lake City, Utah; J. T. Farrer, Provo, Utah; Preston G. Peterson, Provo, Utah.

CONSOLIDATED MASCOT MINES CORP.

Location of mine, Peter, (via Hailey), Idaho. Capitalization 1,000,000 shares par value \$1.00. Charles Peter, General Manager; D. J. Cook, General Superintendent. Offices, Pocatello, and Hailey, Idaho, and Salt Lake City, Utah.

THE ONTARIO SILVER MINING CO.

Location of mine, Park City, Utah. Capitalization, 150,000 shares. Par value, \$1.00. Officers and directors: J. E. Bamberger, Pres.; Ernest Bamberger, Vice-Pres. Treas. and Gen. Mgr.

THE PRINCE CONS. M. & C. COMPANY.

Location of mine and works, Pioche, Nevada. Capitalization, 1,000,000 shares. Par value, \$2. Officers and directors: A. H. Godbe, Pres.; George Wasson, Vice Pres.; M. C. Godbe, Sec. and Gen. Mgr.; W. S. McCornick, Treas.; above with D. L. Wertheimer, directors; Murray Shepherd, Asst. Sec. Main office, 1118 Newhouse Bldg., Salt Lake City, Utah.

THE RIDGE & VALLEY MINING CO.

Location of mines, Eureka, Tintic district, Utah. Capitalization, 1,000,000 shares. Par value, 50 cents. Stock issued, 500,000

shares. Official staff: Wm. R. Wallace Pres., Jackson C. McChrystal, Vice-Pres. and Gen. Mgr.; Herbert S. Auerbach, Treas.; James E. Berkley, Sec. Mine office, Eureka, Utah. Main office, 723 Kearns Bldg., Salt Lake City, Utah.

THE SILVER KING, CON. MNG. CO. OF UTAH.

Location of mines, Park City, Utah. Capitalization, 1,250,000 shares. Par value, \$1. Solon Spiro, Pres. and Gen. Mgr.; R. P. Morris, Vice-Pres.; Geo. Browning, sec; D. L. Wertheimer, Treas. Office, Newhouse block, Salt Lake City, Utah.

SIMON SILVER-LEAD MINES COMPANY.

Location of mines, Belling mining district, Mineral county, Nevada. Capitalization, 1,500,000 shares. Par value, \$1.00. Officers: P. A. Simon, Pres.; C. C. Boak, Vice-Pres.; B. W. Zachau, Sec. and Treas. Office, Mina, Nevada.

THE UTAH COPPER CO.

Location of mines, Bingham, Utah. Location of mills, Arthur and Magna, Utah. Authorized capitalization, 2,500,000 shares. Par value, \$10 per share. Officers: C. M. MacNeill, Pres.; D. C. Jackling, Vice-Pres. and Managing Director; R. C. Gemmell, Gen. Mgr.; K. R. Babbit, Sec.; and C. F. Jennings, Purchasing Agt. Main office, Deseret National Bank Bldg., Salt Lake City, Utah.

THE YELLOW PINE MINING CO.

Location of mine, Good Springs district, Clark Co., Nev., Capitalization, 1,000,000 shares. Par value, 1. Officers and directors: J. F. Kent, Pres.; C. W. Kent, Treas. Directors: S. H. Westfall, Dr. R. B. Chapman, S. E. Young, Charles K. Barnes, General Manager. Office, Good Springs, Nevada.

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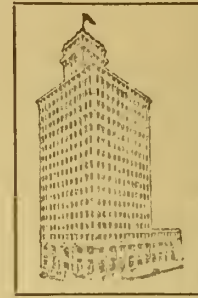
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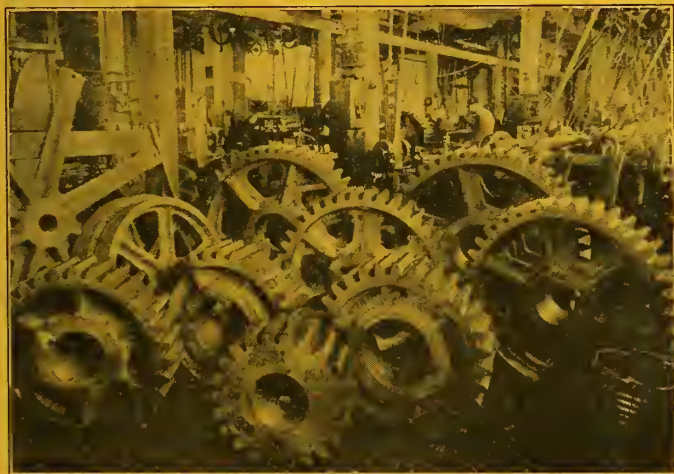
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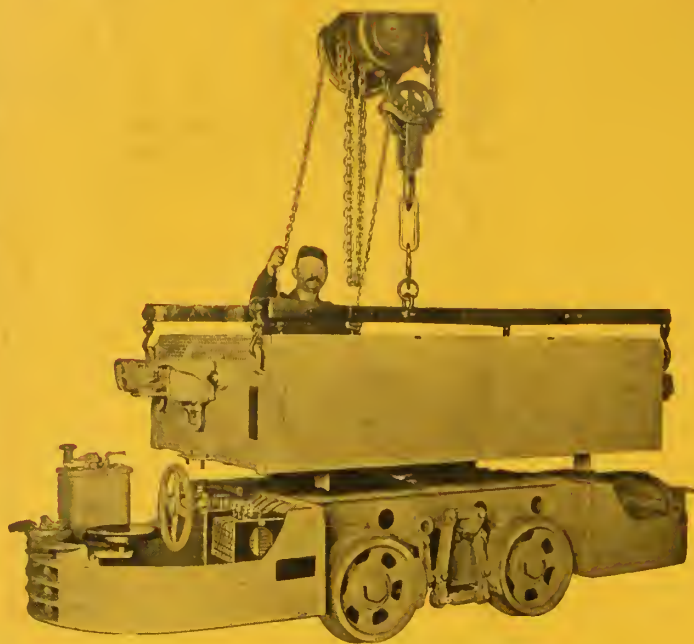
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